

EXHIBIT B

1 IN THE UNITED STATES DISTRICT COURT
2 FOR THE SOUTHERN DISTRICT OF TEXAS
3 HOUSTON DIVISION

4 -----x
5
6 In re ANADARKO PETROLEUM Civil Action No.
7 CORPORATION SECURITIES 4:20-cv-00576
8 LITIGATION

9 -----x
10
11 **CONFIDENTIAL**

12
13 REMOTE VIDEOTAPED DEPOSITION BY VIRTUAL ZOOM OF
14 ROCCO DETOMO, JR., Ph.D.
15 Thursday, March 9, 2023

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24 Reported By: Lynne Ledanois, CSR 6811
25 Job No. 5781021

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 CORPORATION SECURITIES 4:20-cv-00576
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 8
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 10
 11
 12 Videotaped deposition of ROCCO DETOMO, JR.,
 13 Ph.D., taken in Indialantic, Florida commencing at
 14 11:34 a.m. EST on Thursday, March 9, 2023 before
 15 Lynne Ledanois, Certified Shorthand Reporter No.
 16 6811
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1 REMOTE APPEARANCES
 2
 3 ALSO PRESENT:
 4 John MacDonnell, Videographer
 5 Kallie Gallagher, Occidental
 6 Lyndon Pittinger
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1 REMOTE APPEARANCES
 2
 3 Counsel for the Lead Plaintiffs:
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 17 CHARLES BLOOM
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 3 Examination by: Page
 4 Ms. Jensen 10
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2 Deposition	Description	Page	2 Deposition	Description	Page
3 Exhibit 527	Expert Report of Dr. Rocco	18	3 Exhibit 540	Email chain, 10/21/15,	207
4 Detomo, Jr., 1/25/23;			4 APC-00052041;		
5 Exhibit 528	Document headed, Shenandoah:	74	5 Exhibit 541	Document headed, Shenandoah	232
6 Sizing it Right, A Retrospective,			6 Exploration - Development		
7 Tech Forum, 7/18/17;			7 September 2013,		
8 Exhibit 529	Document headed, The Role of the	94	8 APC-00001505;		
9 Engineer in Exploration:			9 Exhibit 542	Document headed, Chapter 3, Risk	240
10 Expected Value, Lisa Ward,			10 Analysis of Exploration Prospects;		
11 11/10/20;			11		
12 Exhibit 530	Document headed, Shenandoah:	126	12		
13 Major Discovery Confirmed			13		
14 Valued at \$4/share,			14		
15 BOFAS_APC-000259;			15		
16 Exhibit 531	Document headed, Development	135	16		
17 Full Field Economics, April 2015,			17		
18 APC-00027887;			18		
19 Exhibit 532	Document headed, Meeting of the	145	19		
20 Board of Directors, August 1 & 2,			20		
21 2016, Day 1 Slides,			21		
22 APC-00784657;			22		
23			23		
24			24		
25 ///			25 ///		
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1 INDEX OF EXHIBITS			1		
2 Deposition	Description	Page	1 Thursday, March 9, 2023		
3 Exhibit 533	Email chain, 7/27/16,	161	2 11:34 a.m. EST		
4 APC-00264139;			3 -----		
5 Exhibit 534	Document headed, Asphaltene	176	4 THE VIDEOGRAPHER: We're on the record.		
6 Onset Pressure Uncertainty and			5 It's 11:34 a.m. Eastern time on March 9th, 2023. 11:34AM		
7 Other Asphaltene Issues in			6 This is the deposition of Dr. Rocco Detomo, Junior.		
8 Field Development Planning,			7 We're here in the matter of Anadarko		
9 APC-01760992;			8 Petroleum Corporation securities litigation.		
10 Exhibit 535	Document headed, 2016 Q1 IPT	184	9 I'm John McDonnell, the videographer with		
11 Partner Meeting, April 5, 2016,			10 Veritext. 11:35AM		
12 APC-01183190;			11 Before the reporter swears the witness,		
13 Exhibit 536	Document headed, Shenandoah Field	190	12 would counsel please identify themselves beginning		
14 Development, Flow Assurance,			13 with the noticing attorney.		
15 October 23, 2014;			14 MS. JENSEN: Good morning. This is Rachel		
16 Exhibit 537	Email, 9/5/14,	195	15 Jensen from Robbins Geller Rudman & Dowd on behalf 11:35AM		
17 APC-00011721;			16 of plaintiffs in the class. With me this morning		
18 Exhibit 538	Document headed, Asphaltene	199	17 and today are Raphaella Friedman and Nicole		
19 Mitigation, April 2015;			18 Gilliland.		
20 APC-00044530;			19 MS. PHILLIPS: Good morning. This is		
21 Exhibit 539	Document headed, "Workshop Day 1:	202	20 Lauren Phillips of Cravath Swaine & Moore for the 11:35AM		
22 Reservoir Uncertainties,			21 defendants. With me are my colleagues Benjamin		
23 November 18, 2014,			22 Gruenstein and Charles Bloom of my firm and Kallie		
24 APC-00349108;			23 Gallagher of Occidental.		
25 ///			24 ROCCO DETOMO, JR., Ph.D.,		
		Page 7	25 having been duly sworn, testified as follows: 11:35AM		Page 9

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1 EXAMINATION 11:35AM	1 service providers that provide ocean bottom seismic 11:38AM
2 BY MS. JENSEN:	2 capability.
3 Q Good morning, Dr. Detomo. Where are you	3 Q And what was the nature of your opinion in
4 physically located today?	4 that case?
5 A Physically located at my residence in 11:36AM	5 A The nature of my opinion was to -- whether 11:38AM
6 Florida on the East Coast just south of Cape	6 or not the one design and implementation infringed
7 Canaveral.	7 upon the patent of the other.
8 Q Is anybody else in the room with you?	8 Q And was your testimony admitted in that
9 A No.	9 case?
10 Q Do you have any documents in reach? 11:36AM	10 A I don't know the current resolution of that 11:39AM
11 A The only document I have is a written copy	11 case. I have not heard anything for approximately one
12 of my report.	12 year.
13 Q Is that a clean copy?	13 Q So you don't know one way or the other?
14 A Yes, it is.	14 A Correct.
15 Q Any other documents? 11:36AM	15 Q The patent case that you mentioned, was 11:39AM
16 A No.	16 that -- I may mispronounce this, Mageis FF LLC
17 Q And have you removed all technology not	17 versus Seabed Geosolutions U.S. Inc.?
18 needed for this deposition today?	18 A Yes. And it's Mageis.
19 A Yes, I believe so.	19 Q Thank you. You did have your deposition
20 Q Okay. Have you ever been deposed before? 11:36AM	20 taken in that case; correct? 11:39AM
21 A Yes.	21 A Yes.
22 Q How often or how many times?	22 Q And you told the truth in that deposition;
23 A Twice.	23 correct?
24 Q And what occasion were those depositions?	24 A Yes.
25 A One occasion was in defense of a case with a 11:36AM	25 Q That was not a securities fraud case; 11:40AM
Page 10	Page 12
1 drilling contractor, turnkey drilling contractor with 11:37AM	1 right? 11:40AM
2 Shell. And the other was a case associated with a	2 A No.
3 patent suit.	3 Q Neither was the other contractor drilling
4 Q Were you a percipient witness or an expert	4 case?
5 witness in the drilling contractor case? 11:37AM	5 A No. 11:40AM
6 A I believe it was an expert witness because I	6 Q Your opinions have never been admitted in
7 had not participated in the drilling of the well.	7 a securities fraud case; correct?
8 Q And what party did you appear on behalf	8 A Correct.
9 of?	9 Q Did you prepare for this deposition?
10 A On behalf of Shell Oil. 11:37AM	10 A I reread certain sections of my report, so 11:40AM
11 Q You used to work for Shell Oil; correct?	11 yes.
12 A Yes.	12 Q Did you meet with anyone?
13 Q What is the name of that case?	13 A Yes.
14 A I do not recall. It was in the early 1990s.	14 Q And who did you meet with?
15 Q What was the nature of your opinion? 11:38AM	15 A I met with some of the Cravath lawyers. 11:40AM
16 A Nature of my opinion was a technical	16 Q And which lawyers did you meet with?
17 evaluation as to whether or not the well had	17 A I met with Lauren Phillips, Charles Bloom
18 penetrated salt.	18 and -- principally. I think Mr. Ben Gruenstein
19 Q And was your testimony admitted in that	19 actually sat in on part of it.
20 case? 11:38AM	20 Q How long did you meet with the Cravath 11:41AM
21 A The case was settled out of court the day	21 folks?
22 before it was to go to trial.	22 A You mean in preparation for this?
23 Q You mentioned another case. What was the	23 Q Yes.
24 patent case?	24 A I met twice, both times for a few hours.
25 A It was a patent lawsuit between two seismic 11:38AM	25 Q And when did you meet with them? 11:41AM
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<p>1 A I believe last Friday. I would have to 11:41AM 2 check to be absolutely sure, but I believe last Friday 3 and then the Friday before.</p> <p>4 Q So you met with them on -- it would be 5 Friday, February 24th and March the 3rd? 11:41AM</p> <p>6 A To the best of my recollection, that was the 7 two days.</p> <p>8 Q You said a couple of hours each. How much 9 time total did you meet with the attorneys?</p> <p>10 A So I would say between -- for those two 11:42AM 11 meetings, the total was between four and six hours.</p> <p>12 Q You mentioned that you reviewed or 13 rereviewed portions of your report. Is there 14 anything in your report you would like to withdraw 15 or modify? 11:42AM</p> <p>16 A No.</p> <p>17 Q You stand by your report in its entirety?</p> <p>18 A Yes.</p> <p>19 Q Is there any further work you intend do?</p> <p>20 A Not that I am aware of. I'm not aware of 11:42AM 21 any other work that I have been asked to perform in 22 the future.</p> <p>23 Q Any opinions you intend to offer at trial 24 other than those set forth in your report?</p> <p>25 A There are no opinions I intend to offer that 11:42AM</p>	<p>1 A Well, Anadarko Corporation was bought by 11:44AM 2 Occidental Corporation.</p> <p>3 Q And do you know whether Occidental is a 4 named defendant in this case?</p> <p>5 A I'm assuming they are because they inherit 11:44AM 6 that liability. So I'm assuming that the current 7 defendant is Occidental.</p> <p>8 Q Do you know who the other defendants are?</p> <p>9 A I believe there were some individual 10 defendants who were actually employees of Anadarko at 11:44AM 11 the time, but I could not -- I would recognize a few 12 of them, but I would not be able to recite the entire 13 list.</p> <p>14 Q Do you know any of those individuals?</p> <p>15 A Personally, no. 11:45AM</p> <p>16 Q Any other capacity?</p> <p>17 A No, I've never run into them work wise or 18 otherwise.</p> <p>19 Q You worked with Occidental before?</p> <p>20 A Not closely and not in a partnership. But I 11:45AM 21 do know or have occasion to have been acquaintances 22 with people who have worked at Occidental.</p> <p>23 Q And who is that?</p> <p>24 A I'm trying to recall their names.</p> <p>25 There's -- I don't recall names offhand, but I know 11:45AM</p>
<p>Page 14</p> <p>1 are different than the ones in my report. 11:42AM</p> <p>2 Q I take it that you've read Dr. Merrill and 3 Mr. Pittenger's reports. Have you read any other 4 expert reports in this case?</p> <p>5 A Those are the only two expert reports I've 11:43AM 6 read.</p> <p>7 Q When were you retained in this case?</p> <p>8 A I was retained in this case I believe a 9 little over a year ago.</p> <p>10 Q So in 2022, approximately what month? 11:43AM</p> <p>11 A I would guess February, but I would have to 12 check records to be sure.</p> <p>13 Q Do you know who the defendants are in the 14 case?</p> <p>15 A I know that the title on the defendants is 11:43AM 16 Georgia Firefighters Fund, which I am assuming is a 17 company that represents investments. But that's all I 18 know about it.</p> <p>19 Q Okay. So just to be clear, the suing 20 party is the plaintiffs; right? Who were the 11:43AM 21 defendants in the case?</p> <p>22 A Oh, the defendants, sorry. The defendants 23 in this case were originally Anadarko Corporation.</p> <p>24 Q Are you saying that it's a different 25 defendant now? 11:44AM</p>	<p>Page 15</p> <p>1 there are people I've met at industry conferences who 11:45AM 2 have had conversations -- worked at Occidental.</p> <p>3 Q How many hours have you spent on this 4 case?</p> <p>5 A Again, I would have to make an estimate 11:46AM 6 without checking records, but my estimate off the top 7 of my head would be between 400 and 600 hours.</p> <p>8 Q How many of those hours did you spend on 9 your report?</p> <p>10 A I would guess two-thirds of those hours were 11:46AM 11 on the report.</p> <p>12 Q How much have you been paid by defendants 13 in this case?</p> <p>14 A I'm paid by the hour at the rate of \$300 per 15 hour. 11:46AM</p> <p>16 Q And so what is the total?</p> <p>17 A Let's see. So 400 times 300 would be 18 \$120,000.</p> <p>19 Q Do you have any outstanding invoices?</p> <p>20 A Yes. 11:47AM</p> <p>21 Q And in what amount?</p> <p>22 A I believe it's \$1500.</p> <p>23 Q If you'll bear with me, I'm going to mark 24 an exhibit here. Okay.</p> <p>25 Dr. Detomo, you should be able to see what 11:47AM</p>

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1 I've marked as Exhibit 527. I'm hoping that you 2 will recognize this document. 3 (Whereupon, Exhibit 527 was marked for 4 identification.) 5 THE WITNESS: I just clicked in Veritext, 11:47AM 6 I see the document. Let me open it. 7 At least the cover page appears to be the 8 cover page of my report. 9 BY MS. JENSEN: 10 Q And that's your name on the front page of 11:48AM 11 the report? 12 A Yes, it is. 13 Q Could you scroll through just briefly -- 14 if you read the whole thing, we'll probably just 15 spend the whole day on this one question, so let's 11:48AM 16 not do that. 17 If you can just scroll through and confirm 18 for me that that is a true and accurate copy of your 19 expert report from January 25th, 2023. 20 A Yes, this looks like you have to click 11:49AM 21 instead of scroll. So I would like to -- I don't know 22 if there is a quick way to get to the end. 23 Q Let's go off the record for a second. 24 A Okay. 25 THE VIDEOGRAPHER: We're off the record. 11:49AM Page 18	1 Q Okay. When you say "complaints," do you 11:55AM 2 mean the amended complaint in this case? 3 A It was a complaint that had -- I'm not sure 4 exactly which version of the complaint it is. But 5 there was a version of the complaint that had a series 11:55AM 6 of statements in it that I responded to in my report, 7 a complaint from the plaintiffs. 8 Q In terms of providing documents, did you 9 receive documents from counsel for purposes of your 10 report? 11:55AM 11 A Counsel did forward documents to me when I 12 requested them or I requested document about a certain 13 area or a topic, yes. 14 Q Did you receive assistance in editing your 15 report? 11:56AM 16 A I believed some comments about what I had 17 written but not specifically in doing editing of the 18 report. So I actually went back and made some edits 19 myself. 20 But the edits, they were just suggestions 11:56AM 21 about, hey, you need to clarify this and things like 22 that. 23 Q Did you talk to anyone about the content 24 of your report before it was finalized? 25 A I had talked to the Cravath lawyers about 11:56AM Page 20
1 It's 11:49 a.m. 11:49AM 2 (Recess taken.) 3 THE VIDEOGRAPHER: We're back on the 4 record. It's 11:53 a.m. 5 BY MS. JENSEN: 11:53AM 6 Q Okay. So, Dr. Detomo, I just want to 7 reask the question. 8 Does this appear to be a true and accurate 9 copy of your expert report dated January 25th, 2023? 10 A Yes, it is. 11:54AM 11 Q Who wrote this report? 12 A I did. 13 Q Did you receive any assistance in writing 14 the report? 15 A I received some assistance in -- around what 11:54AM 16 topics and in terms of providing documents, but I 17 wrote all of the report. So nobody wrote any sections 18 of it. 19 Q What assistance did you receive around 20 what topics to write on? 11:54AM 21 A So it was just a list of topics. So, for 22 instance, I was instructed to read and give my opinion 23 on complaints. I was instructed to read and give my 24 opinion on the expert reports. 25 And so -- and that's what I did. 11:55AM Page 19	1 the version of my report before I finalized it. 11:56AM 2 Q How many times? 3 A The report was a body of work which was not 4 written all at one time, so it was written over the 5 period of a number of months. 11:57AM 6 And occasionally I would send a version to 7 the Cravath lawyers and ask them if they -- you 8 know, if there were anything that needed 9 clarification or if there was something else I 10 needed to address. 11:57AM 11 So, for instance, the expert reports came 12 in later. And then I had to go through and write 13 the areas that addressed them. 14 Q What was your assignment? 15 A My assignment was to read the information 11:57AM 16 that was available and to offer my expert opinion on 17 the validity or comments on the -- on what I read, 18 mostly around technical matters, well, entirely around 19 technical matters. 20 Q Now, in your report, you say that you were 11:58AM 21 asked to review and respond to the expert reports of 22 Dr. Merrill and Mr. Pittenger; correct? 23 A Yes. 24 Q Also says that you were retained to 25 provide opinions about Anadarko's appraisal of the 11:58AM Page 21

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1 Shenandoah prospect in its public statements related 11:58AM	1 Those would be some of the opinions that Dr. Merrill 12:01PM
2 thereto; correct?	2 or Mr. Pittinger had to which I didn't comment.
3 A For some -- I don't know all of the public	3 Q I think we were getting a little confused
4 statements, but to the subset of public statements I	4 here. So what I'm trying to ask you is: Could you
5 was provided, yes. 11:58AM	5 please identify any opinion that you're offering 12:01PM
6 Q And the public statements that you were	6 that is not in rebuttal?
7 provided, those are the ones that you commented on	7 A I did not specifically go through and
8 in your report?	8 identify which particular lines that I agreed with.
9 A Yes.	9 So I only captured in the report the ones in general I
10 Q So the purpose of your report was to rebut 11:59AM	10 disagreed with. 12:02PM
11 Dr. Merrill and Dr. Pittinger; correct?	11 There may be one or two in there where I
12 A No, the purpose of my report was to make	12 mentioned that I agree with a certain opinion. But
13 comment as to my technical opinion with respect to	13 I would have to look for them.
14 some of the opinions that they had made. So in my	14 Q Okay. So if I understand correctly then,
15 professional experience, some of those opinions I 11:59AM	15 all of your opinions are in rebuttal to Dr. Merrill 12:02PM
16 agreed with and some of them I did not.	16 and Mr. Pittinger?
17 Q Okay. So I think I'm asking a different	17 A Most of the opinions I wrote of in the
18 question. So maybe we're kind of crossing each	18 report are in rebuttal, yes.
19 other here.	19 Q So now what I'm trying to get at is tell
20 A Okay. 11:59AM	20 me which opinions are not in rebuttal. 12:02PM
21 Q So what I'm saying is that the purpose of	21 A I would have to look through the report to
22 your report, as you just mentioned, was to respond	22 identify exactly which ones. But I think -- give me a
23 to the plaintiffs' expert reports; correct?	23 second. Let me think. I think there were some
24 A That was one of the purposes. The purpose	24 comments -- well, I would have to speculate.
25 was to offer my technical opinion about comments and 11:59AM	25 I believe there were some comments by 12:03PM
Page 22	Page 24
1 issues that were raised, technical opinions about 12:00PM	1 Mr. Pittinger associated with the purpose of Rose & 12:03PM
2 them.	2 Associates' software, which there were certain parts
3 Q That was all within the scope of rebutting	3 of his opinions about that that I agreed with.
4 the reports of Dr. Merrill and Mr. Pittinger;	4 Q So let's not focus on what you did not
5 correct? 12:00PM	5 say. Let's focus on what you did say. 12:03PM
6 A I was not specifically asked to rebut them.	6 You can refer to your report if you need
7 I was asked to make comment on them and the ones I	7 to. But my question is: Which of your opinions, if
8 disagreed with, I rebutted.	8 any -- maybe there's none. But which opinions, if
9 Q Okay. So maybe we're just not	9 any, are not in rebuttal to Dr. Merrill and
10 understanding each other exactly because there's 12:00PM	10 Mr. Pittinger? 12:03PM
11 some terminology around this in litigation.	11 A Without going through and specifically
12 So do you understand that there is a	12 looking for them and searching for them in the report,
13 difference between affirmative opinions and rebuttal	13 I would not be able to state which ones they are off
14 opinions?	14 the top of my head.
15 A Yes. 12:00PM	15 Q Okay. We can go through your report. Why 12:04PM
16 Q Okay. So that's what I'm trying to get	16 don't you go through your report and tell me which
17 at. So your opinions are in rebuttal to Dr. Merrill	17 ones are not in rebuttal.
18 and Mr. Pittinger; is that right?	18 A Can I search within this document?
19 A A number of opinions I made in here were in	19 Q I believe so. Let's go off the record for
20 rebuttal to theirs, yes. 12:01PM	20 a moment. 12:04PM
21 Q So now we're getting somewhere. So let's	21 THE VIDEOGRAPHER: We're off the record
22 talk about outside of rebuttal, what are the	22 it's 12:04 p.m.
23 opinions that you're offering that are not just in	23 (Recess taken.)
24 rebuttal?	24 THE VIDEOGRAPHER: Back on the record.
25 A I would have to look specifically for those. 12:01PM	25 It's 12:12 p.m. 12:12PM
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1 BY MS. JENSEN: 12:12PM	1 Q Dr. Detomo, earlier I asked you about your 12:17PM 2 compensation in this case. So I believe you 3 testified that you're being compensated at an hourly 4 rate of \$300 per hour?
2 Q Okay. So, Dr. Detomo, you have had an 3 opportunity to look at your report. Are you able to 4 answer the question that I asked?	5 A Yes. 12:18PM 6 Q But your report says \$600 per hour; 7 correct?
5 A I don't -- I don't find a specific example 12:12PM 6 that I could show in my report at this time to -- that 7 would be an affirmative response to an opinion by 8 Dr. Pittinger -- or Dr. Merrill or Mr. Pittinger. I 9 believe that was your question.	8 A I don't recall that. I would have to look 9 at my report to see.
10 Q So my question, I want to make sure we 12:13PM 11 understand each other. You were talking earlier 12 about your rebuttal opinions as we call it in the 13 business.	10 Q Look at Paragraph 14. You have the hard 12:18PM 11 copy in front of you; right?
14 So my question to you is: Do you have any 15 opinions that are outside the scope of rebuttal, and 12:13PM 16 that's what you were asked to look through your 17 report for?	12 A Yes. 13 Q You can look at the hard copy. We wanted 14 to authenticate your expert report in the first 15 instance, but I think from here on out, it would 12:18PM 16 probably be easier to refer to the hard copy.
18 A Yes, and my answer is I do not find in my 19 report affirmative opinions or anything confirming or 20 affirmative opinions about those, so no. 12:13PM	17 A Okay. Paragraph 14? That's an error. 18 Q It's actually 300? 19 A It is 300, that's an error.
21 Q Okay. You can set that aside.	20 Q Would you like to amend your report to 12:19PM 21 state that you're being compensated at the rate of 22 \$300 per hour?
22 MS. JENSEN: I'm going to mark another 23 exhibit. Give me a moment here. I need to restart 24 my Exhibit Share. Bear with me for a moment.	23 A Yes, I would. I'm surprised because I know 24 for a fact I wrote 300 in there at one time. So yes.
25 You should be able to see in your Exhibit 12:14PM	25 Because it's never been 600, although 600 12:19PM

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1 Share a document that's been previously marked as 12:14PM	1 would have been nice. 12:19PM
2 Exhibit 4798.	2 Q Okay. You can set that aside for now.
3 A Yes.	3 A Okay.
4 Q And my question is whether you recognize 5 this to be Dr. Merrill's expert report that you were 12:15PM	4 Q I want to ask you about your opinions.
6 responding to in your report?	5 Are you offering an expert opinion in this 12:19PM 6 case on Shenandoah's commerciality?
7 A I'm opening it.	7 A I'm offering an opinion on what it takes for 8 something to be commercial. So in terms of whether or 9 not it's commercial at different stages, the only
8 Yes, this is the document I reviewed.	10 thing I can say is if something is commercial, then it 12:20PM 11 has a clear definition.
9 Q Let me show you another document.	12 So I'm not sure when you say whether or 13 not something is going to be commercial, I don't 14 know how to define that. But I can make a comment
10 You should be able to see in your Exhibit 12:16PM	15 as to whether or not something currently meets or 12:20PM 16 whether or not it will be commercial, yes.
11 Share a document that's been previously marked as 12 Exhibit 499.	17 Q So my question is a little different.
13 Will you please confirm that this was the 14 Pittinger expert report that you were responding to 15 in your report? 12:16PM	18 Are you offering an expert opinion on 19 whether or not Shenandoah was commercially viable 20 during the class period? 12:20PM
16 A Is the one you just put in 499?	21 A I'm not exactly sure what the word "viable" 22 means. I can offer an opinion as to whether or not it 23 was -- during the class period, whether or not the
17 Q Yes, it is.	24 proper work was being done to define whether or not it 25 was commercial. 12:21PM
18 A Because it went in a different order, but 19 okay. Apparently it orders them by number.	Page 29

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<p>1 Q The answer to my question is no? 12:21PM</p> <p>2 A I don't know what the word "viable" means.</p> <p>3 So you have to define that. What do you mean by 4 "viable"?</p> <p>5 Q You're not familiar with that term? 12:21PM</p> <p>6 A Not with respect to commerciality. So I 7 would say I could offer an opinion as to whether or 8 not something is commercial.</p> <p>9 Q So are you offering an opinion on whether 10 or not Shenandoah was commercial during the class 12:21PM</p> <p>11 period?</p> <p>12 A Yes.</p> <p>13 Q And is your opinion that it was commercial 14 at the time?</p> <p>15 A No, it's my opinion that the right 12:21PM</p> <p>16 information was being collected to decide if it was 17 commercial.</p> <p>18 Q So you're not offering an opinion one way 19 or the other whether Shenandoah was commercial 20 during the class period? 12:21PM</p> <p>21 A You can only offer an opinion about 22 commerciality if you have the information that defines 23 it.</p> <p>24 During the class period, the information 25 was ambiguous enough to not know yet whether or not 12:22PM</p>	<p>1 I have quite a bit of experience with it. 12:23PM</p> <p>2 Q Are you offering an expert opinion that</p> <p>3 Anadarko's statements to investors were not false 4 and misleading as to Shenandoah?</p> <p>5 A The expert opinions that I -- or the 12:24PM</p> <p>6 disclosures to the public that I reviewed, yes, they 7 were not misleading in my expert opinion.</p> <p>8 Q Are you offering an opinion that</p> <p>9 Anadarko's statements to investors were appropriate 10 under SEC disclosure rules? 12:24PM</p> <p>11 A The ones I reviewed, yes.</p> <p>12 Q Are you offering an expert opinion that</p> <p>13 the alleged omissions were legally immaterial?</p> <p>14 MS. PHILLIPS: Objection.</p> <p>15 THE WITNESS: Yes. Okay. 12:24PM</p> <p>16 Yes, I don't have an opinion on what</p> <p>17 defines the legality of what they did. I can only</p> <p>18 respond as to the technical merit of what they said.</p> <p>19 BY MS. JENSEN:</p> <p>20 Q Are you opining that the alleged omissions 12:24PM</p> <p>21 were unimportant to investors?</p> <p>22 A Any -- when you report to investors, you 23 usually report truthfully facts. And any -- I'm not</p> <p>24 sure how to define whether or not omissions are</p> <p>25 important. 12:25PM</p>
<p>Page 30</p> <p>1 it was commercial. 12:22PM</p> <p>2 So during the class period I could not</p> <p>3 say, with the information at that time, whether or</p> <p>4 not it was going to be commercial. By today's</p> <p>5 information I can. 12:22PM</p> <p>6 MS. JENSEN: I'm going to strike the</p> <p>7 answer after "going to be commercial" as beyond the</p> <p>8 scope and nonresponsive.</p> <p>9 Q Are you offering an expert opinion on the</p> <p>10 work of petroleum or reservoir engineers? 12:22PM</p> <p>11 A Yes.</p> <p>12 Q Are you offering an expert opinion on the</p> <p>13 work of geologists in this case?</p> <p>14 A Yes.</p> <p>15 Q Geophysicists? 12:23PM</p> <p>16 A Yes.</p> <p>17 Q Are you offering an expert opinion on</p> <p>18 faulting and compartmentalization?</p> <p>19 A Yes.</p> <p>20 Q Are you offering an expert opinion on the</p> <p>21 impact of asphaltene deposition and mitigation? 12:23PM</p> <p>22 A I'm offering the level of knowledge and</p> <p>23 experience that I have with respect to it.</p> <p>24 As to whether it reaches the level of</p> <p>25 expert opinion, I don't know what that level is, but 12:23PM</p>	<p>Page 32</p> <p>1 Every piece of information to an investor 12:25PM</p> <p>2 might be important, but not all information is</p> <p>3 always exposed to investors or anyone outside of the</p> <p>4 company.</p> <p>5 Q Are you offering a truth on the market 12:25PM</p> <p>6 defense?</p> <p>7 A I'm not sure I understand what market</p> <p>8 defense is.</p> <p>9 Q Are you offering a truth on the market</p> <p>10 defense? 12:25PM</p> <p>11 A I do not know what that is, so I would have</p> <p>12 to say I can't comment one way or another without</p> <p>13 knowing what it is.</p> <p>14 Q So in formulating your report, you</p> <p>15 reviewed documents that were provided to you by</p> <p>16 counsel, as you mentioned earlier; correct? 12:26PM</p> <p>17 A Yes.</p> <p>18 Q And you also reviewed academic papers?</p> <p>19 A Yes.</p> <p>20 Q And to what areas did you turn to academic</p> <p>21 literature to review? 12:26PM</p> <p>22 A Well, I reviewed -- I referenced a number of</p> <p>23 academic papers that I was already familiar with. So,</p> <p>24 for instance, information academic papers on turbidite</p> <p>25 deposition. I referenced academic papers on 12:26PM</p>

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<p>1 mitigations for asphaltenes. And I'm sure I 12:27PM 2 referenced others as well, so... 3 Q Did you review papers about topics you had 4 less recent or direct experience working with? 5 A I'm trying to recall any topics that I had 12:27PM 6 that I made comments on that I did not have a lot of 7 experience with. So I may or may not have. 8 I don't recall specifically which papers I 9 might have reviewed which were in areas that I had 10 less experience with. Usually I looked for academic 12:28PM 11 papers in areas that I was already familiar with. 12 Q And did you provide in the case all the 13 academic papers or literature upon which you relied? 14 A Any of the ones that I quoted, I included in 15 my -- that I referenced in my report, I included. I 12:28PM 16 may or may not have read additional papers as well. 17 So I didn't reference every paper that I 18 had read. 19 Q Did any of the other papers impact your 20 thinking for the report? 12:28PM 21 A No, they did not. 22 Q What is meant by the acronym MMRA? 23 A MMRA is a term used to define a process for 24 doing risk assessments. 25 Q What does the acronym mean or what does it 12:29PM</p>	<p>1 A No, I have not. 12:31PM 2 Q You didn't because you didn't feel it was 3 necessary to do so; correct? 4 A I didn't do it because I didn't have all the 5 appropriate data that would be necessary to do it. 12:31PM 6 Q But you still stand by the conclusions of 7 your report; right? 8 A I stand by the conclusions of my report 9 based upon the number of times I've used that software 10 in the past. 12:31PM 11 Q But you stand by your report even though 12 you did not independently calculate any of the MMRA 13 values? 14 A Yes. 15 Q Who typically conducts an MMRA analysis in 12:31PM 16 a project like Shenandoah? 17 A The analysis is usually performed by an 18 integrated team that each bring information to bear to 19 assess what the different risk and range of values 20 might be. 12:32PM 21 Q And who actually runs the analysis? 22 A It varies from company to company. It's 23 usually one of the subsurface people, so either a 24 geologist, geophysicist or reservoir engineer. 25 Q At Anadarko, it's the reservoir engineer; 12:32PM</p>
<p>Page 34</p> <p>1 stand for? 12:29PM 2 A The specifics of the acronym I would have to 3 look up because they are -- they are specific to a 4 company, but it's -- so I don't know what the two 5 first Ms necessarily stand for without referencing it 12:29PM 6 again. But it's a risk assessment methodology which 7 is followed by Anadarko. 8 Q What is the company name? 9 A The company name that proposes MMRA is 10 Rose & Associates. 12:29PM 11 Q What is the nature of the methodology? 12 A The nature of the methodology is to -- is to 13 try to define both a risk-based volume assessment of 14 an opportunity where the range of values have a great 15 deal or a range of uncertainty associated with it. 12:30PM 16 Q You did not conduct your own MMRA analysis 17 in this case, did you? 18 A No, I did not. 19 Q Did you ask anyone else to conduct an MMRA 20 analysis for you? 12:30PM 21 A No, I did not. 22 Q Did you do your own calculations about 23 what the P10 or P90 should have been at any given 24 point leading up to or during the class period with 25 respect to Shenandoah? 12:31PM</p>	<p>Page 35</p> <p>1 correct? 12:32PM 2 A I don't know if they have required it to be 3 the reservoir engineer. I know the reservoir engineer 4 at Anadarko actually did do some of the runs. 5 But I know that those runs are made by a 12:32PM 6 variety of people. 7 Q At Anadarko, the runs were by engineers 8 and not geophysicists or geologists; correct? 9 A Yes, I don't -- the numbers are reported 10 from the team. So who actually pushed the buttons in 12:32PM 11 the -- in running the program, I don't know 12 specifically who did that. 13 Q You just don't know one way or the other? 14 A I know for a fact that the geology, the 15 geophysics play a huge role in knowing what values to 12:33PM 16 put in. 17 Q That's not the question I'm asking. 18 I'm asking whether you know at Anadarko 19 who ran the MMRA analysis for Shenandoah? 20 A There are some runs that have a name 12:33PM 21 associated with them. So those runs you would be able 22 to know who ran them. 23 Q Right. It was the reservoir engineer; 24 correct? 25 A On most of the ones I looked at, yes. 12:33PM</p>

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1 Q You're not aware of any run that had	12:33PM	1 Now, you reviewed a number of seismic	12:37PM
2 someone other than an engineer; right?		2 images for this case; correct?	
3 A There were hundreds of runs. So I don't		3 A Yes.	
4 recall any of them specifically having a name that was		4 Q Can you describe how seismic images are	
5 not a reservoir engineer.	12:34PM	5 created?	12:37PM
6 Q Now, in your experience, you've never had		6 A Sure. One creates sound waves at or near	
7 exclusive responsibility for conducting an MMRA		7 the surface. The sound waves propagate through the	
8 analysis; right?		8 earth. Anyplace that there is a change in the	
9 A No, that's not true.		9 acoustic impedance in the earth, the sound waves are	
10 Q Okay. So which -- tell us about your	12:34PM	10 partially transmitted and partially reflected.	12:38PM
11 experience where you had exclusive responsibility		11 Any of the reflected sound energy that	
12 for conducting an MMRA analysis.		12 reaches back to the surface is collected with	
13 A For one year I was Shell's representative to		13 acoustic sensors.	
14 Rose & Associates for developing and applying their		14 And those acoustic waves, as they are	
15 software. So I actually made MMRA runs with	12:34PM	15 collected back at the surface, can then be resembled	12:38PM
16 Rose Associates' software many times.		16 and used to image a version of the earth that	
17 Q And when was that?		17 represents where acoustic impedances are hard and	
18 A That was in the late 2000s, so 2006, 2007.		18 where they are soft.	
19 Q And what -- who was your contact at Rose &		19 Q How long does it take to create a 3D	
20 Associates?	12:35PM	20 seismic image?	12:38PM
21 A I worked mostly with Rocky Roden and -- and,		21 A Excuse me.	
22 let's see, Mike Forrest were leading the consortium		22 In the marine world, such as Shenandoah	
23 meetings.		23 is, the seismic acquisition depends on the type of	
24 Q What do you mean by "consortium meetings"?		24 acquisition system used. But the acquiring of the	
25 A The Rose & Associates software was built	12:35PM	25 data typically takes anywhere -- usually on the	12:39PM
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1 upon a series of consortiums that reached across a	12:35PM	1 range of months.	12:39PM
2 number of companies in order to gain input as to what		2 Once the data is acquired, it usually	
3 companies would consider in building a risking		3 takes anywhere from eight months to two years to	
4 software and volumetric calculation.		4 process the seismic data and create an image.	
5 Q Besides Rocky and Mike, did you have any	12:36PM	5 Then on top of that, the computing	12:39PM
6 other contacts at Rose & Associates?		6 capacity and technical capability of the software	
7 A Not specific. I mean, there were various		7 improves over time. So people typically go back and	
8 people that came and went, various experts. So those		8 take older data and reprocess it in order to get an	
9 two I think were integral to the development of the		9 updated image.	
10 software.	12:36PM	10 So anyways, to get an image is years.	12:40PM
11 Q You discuss in your report the		11 Q And you didn't review the underlying	
12 probabilistic and deterministic approaches; right?		12 seismic volume in this case; correct?	
13 A Yes.		13 A I looked at the acquisition and processing	
14 Q And as to the probabilistic and		14 that was done on each of the seismic data volumes that	
15 deterministic approaches, the P90, P50 and P10	12:36PM	15 were used by the Shenandoah JV, but I did not view the	12:40PM
16 scenarios should reconcile with deterministically		16 3D data in a 3D viewer, no.	
17 derived quantities for low, best and high estimates;		17 Q And you did not create your own 3D	
18 right?		18 interpretations for this case?	
19 A Not exactly. They are usually related, but		19 A No, I did not.	
20 they don't necessarily agree.	12:37PM	20 Q And you did not view that as necessary to	12:40PM
21 Q So are you saying that's not industry		21 your work?	
22 standard?		22 A I did not view it as -- it would have been	
23 A No, there is no industry standard for		23 interesting to do. But it would have required a	
24 risking or volumetric calculation.		24 tremendous amount of time and access to a lot of	
25 Q Okay. We'll come back to that.	12:37PM	25 digital data. So it was not a practical thing to try	12:41PM
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1 to approach.	12:41PM	1 A Yes, I don't recall the number.	12:59PM
2 Q And despite not having reviewed the		2 Q Any courses in petroleum engineers?	
3 underlying seismic volume or creating your own 3D		3 A No.	
4 interpretation, you still stand by the conclusions		4 Q Did you take any finance or business	
5 in your report; right?	12:41PM	5 courses?	12:59PM
6 A Yes, I do. Having been a risk and general		6 A No.	
7 manager for seismic interpretive groups in the past, I		7 Q After you obtained your degrees, you	
8 have quite a bit of experience with looking at their		8 worked at Shell for a good spell; right?	
9 output results and trying to identify strengths and		9 A Yes, I worked at Shell for 33 years.	
10 weaknesses.	12:41PM	10 Q And from there you started a consulting	12:59PM
11 MS. JENSEN: Okay. Let's take a quick		11 business?	
12 break.		12 A Yes.	
13 THE WITNESS: Okay. How long?		13 Q Shell is the only oil company you've	
14 MS. JENSEN: Let's go off the record		14 worked for; right?	
15 first.	12:42PM	15 A The only oil company I worked directly for,	1:00PM
16 THE VIDEOGRAPHER: We're off the record.		16 yes.	
17 It's 12:41 p.m.		17 Q At Shell did you receive any formal	
18 (Recess taken.)		18 training in petroleum training?	
19 THE VIDEOGRAPHER: Back on the record,		19 A Yes.	
20 it's 12:57 p.m.	12:58PM	20 Q What courses?	1:00PM
21 BY MS. JENSEN:		21 A A series of courses in petroleum engineering	
22 Q Welcome back, Dr. Detomo.		22 that stretched over a few weeks during my first few	
23 A Thank you.		23 years and then courses in petroleum engineering	
24 Q Let's turn to Appendix 2 of your report.		24 depending upon the requirements of the job I was doing	
25 A Okay.	12:58PM	25 at the time.	1:00PM
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1 Q Okay. And this is your C.V.?	12:58PM	1 Q And your positions were as a geoscientist;	1:00PM
2 A Yes, it is.		2 right?	
3 Q And it's a true, accurate and complete?		3 A Only initially.	
4 A Yes, it is.		4 Q What were all your -- let's take a step	
5 Q So you obtained degrees in physics and	12:58PM	5 back.	1:00PM
6 nuclear physics?		6 So your discipline was geoscience; right?	
7 A Yes.		7 A When I joined Shell Oil Company, I was hired	
8 Q At Ohio State, did you take any courses in		8 as a geoscientist.	
9 petroleum geology?		9 Q Did you take any formal training courses	
10 A No.	12:58PM	10 in geology?	1:01PM
11 Q Did you take any courses in seismic		11 A Yes.	
12 interpretation?		12 Q Which courses?	
13 A No. But I did take courses in acoustic wave		13 A Three field trips to Big Bend, field trips	
14 propagation.		14 to Wyoming, field trips to reach carbonates in the	
15 Q Did you take any courses in geological	12:59PM	15 Gulf of Mexico, trips to look at turbidite outcrops in	1:01PM
16 risk assessment?		16 the Karoo in South Africa.	
17 A No.		17 A number of office geology classes with	
18 Q Economics?		18 senior geologists. Shell ran an extensive program	
19 A Yes.		19 if you were working on a particular type of geology,	
20 Q Which courses?	12:59PM	20 so...	1:01PM
21 A It was like economics -- it was a senior --		21 Q Did you take or receive any formal	
22 a course I took as a senior in undergraduate. Just a		22 training in economic analysis?	
23 general course in economics, undergraduate course in		23 A Yes.	
24 economics.		24 Q Which?	
25 Q Like Econ 101?	12:59PM	25 A In order to move to a management position in	1:02PM
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<p>1 Shell, you needed to take a series of economic courses 1:02PM 2 that were taught -- some were taught internally and 3 some were externally provided. 4 Q What were they? 5 A They were mostly economic courses in how to 1:02PM 6 calculate things like profit investment ratios in 7 earnings, in all of the things you would need in order 8 to evaluate the economics of a prospect or a field. 9 Q And those were in-house? 10 A Some of them were in-house and some of them 1:02PM 11 they brought external consultants or companies in to 12 teach us. 13 Q But at Shell? 14 A At Shell. 15 Q What risk assessment software does Shell 1:03PM 16 use internally, or did it at the time? 17 A Shell uses an internal risk assessment 18 series of software. It's more than one type of 19 software, it's really a process that they use. 20 And it has changed over time, obviously. 1:03PM 21 The software and the process we used in the 1990s 22 was very different than the process we used in 2012. 23 But the software is fairly homegrown and 24 it includes both deterministic and probabilistic 25 estimates. 1:03PM</p>	<p>1 Q But that's a different question. 1:05PM 2 A So I would run the Rose & Associates 3 software on our internal prospects to compare to our 4 internal system for risking. 5 Q You still haven't answered my question, 1:05PM 6 which is did you take any courses? 7 A I don't -- I would have to say no because 8 they did not actually teach courses then. So we would 9 run the software and work together on it. But they 10 didn't teach it as a course. 1:05PM 11 Q So you've never received any formal 12 training? 13 A No, on Rose & Associates' software from 14 Rose & Associates, no. 15 Q Now, the MMRA was used by Anadarko to 1:05PM 16 estimate the potential of Shenandoah; right? 17 A Yes. 18 Q What are the inputs for the MMRA analysis? 19 A Well, it depends. Well, it has a series of 20 inputs. You have to estimate the geologic risk 1:06PM 21 factor -- for risking, you have to estimate the 22 geologic risk factor, which involves estimating the 23 probability of trap, the probability of source, the 24 probability of reservoir, the probability of seal. 25 And I'm not sure if I said charge, but 1:06PM</p>
<p>Page 46</p> <p>1 Q You say it's homegrown, it's proprietary 1:03PM 2 to Shell? 3 A Yes. 4 Q And so let's take the later time frame. 5 What was it called by, say, 2010? 1:04PM 6 A It was just called risk assessment -- 7 Q Okay. 8 A -- at Shell. 9 Q Okay. Now, you personally run the risk 10 assessment software in doing prospect valuations? 1:04PM 11 A I have run the risk assessments and, in 12 fact, I used to teach the risk assessment methodology 13 for the -- at one time for the Gulf of Mexico. 14 Q Teach it to whom? 15 A To younger Shell employees. 1:04PM 16 Q Okay. And so the training was to do this 17 with the homegrown software at Shell? 18 A Yes. 19 Q Did you ever take a Rose & Associate 20 course in risk analysis? 1:04PM 21 A As I mentioned, I was Shell's -- Shell is 22 always interested in keeping tabs on other 23 developments and so for one year, Shell paid to join 24 the consortium and I was their representative to the 25 Rose & Associates group. 1:05PM</p>	<p>Page 48</p> <p>1 there are like five major inputs into looking at 1:06PM 2 that. 3 Then for volumes you have to input 4 information about the size in terms of area, the 5 thickness of the hydrocarbon column. You usually 1:06PM 6 have to put in a factor, some type of shake factor 7 that accounts for the thinning at the edges of it. 8 You have to put in some information if you 9 want recoverables about what the recovery factor is. 10 You have to put in estimates for the porosity. 1:07PM 11 They usually deal with recovery as a 12 single factor rather than looking at the components 13 of recovery factor in Rose & Associates' software. 14 But anyways, you input these in and then 15 it uses a -- an assumption about the distribution of 1:07PM 16 values and the assumption is that they follow a 17 logarithmic distribution. 18 So if you estimate two points on the 19 logarithmic curve, it will estimate the third. 20 Typically they estimate P10, P90 and it 1:07PM 21 will interpolate P50. 22 Q What is meant by P10, P50 and P90 and how 23 are they determined? 24 A Yes, so P50 represents -- of anything, 25 represents there's 50 -- an equal probability of it 1:08PM</p>

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<p>1 being bigger or higher than that value and lower than 1:08PM 2 that value.</p> <p>3 So P50 is a probability of 50 percent. So 1:08PM 4 it has equal probability to be higher or lower.</p> <p>5 Then one can also then estimate P10 and 1:08PM 6 P90. Now, most of the industry with the exception 7 of Marathon, but most of the industry refers to P10 8 as there only being a 10 percent chance that 9 something is -- that it's that value or bigger and 10 P90 would represent a 90 percent chance that 1:08PM 11 something is that big or bigger.</p> <p>12 So when you talk about a P90, that usually 13 represents the small case. When you talk about P10, 14 it usually represents a large case.</p> <p>15 Q What about P1, P99? 1:09PM 16 A In exactly the same way, P1 would represent 17 a 1 percent chance that it's that or bigger. So that 18 would represent the most extreme limit of large -- how 19 large it could be.</p> <p>20 And P99 would represent a 99 percent 1:09PM 21 chance it's that or bigger. So that would represent 22 an almost slam dunk that it's at least that number.</p> <p>23 Q What's a risked mean?</p> <p>24 A The mean?</p> <p>25 Q Risked mean. 1:09PM</p>	<p>1 Q Are resource volumes represented by the 1:11PM 2 P50?</p> <p>3 A Resource volumes are represented by a range, 4 so...</p> <p>5 Q Are they -- is it the P50 or are they 1:11PM 6 represented by a probability weighting?</p> <p>7 A When one talks about the volumetrics of an 8 opportunity, even one that's being produced, there's 9 still some uncertainty associated with it. So you 10 usually deal with the range and you might -- for 1:11PM 11 purposes of simple calculation, you might deal with 12 either the P50 or the mean.</p> <p>13 But in general you usually refer to the 14 range. And the range depends upon company. Some 15 companies it's P10, P90, some companies it's P20, 1:11PM 16 P80.</p> <p>17 Q Did Anadarko use the P50 as the expected 18 resource volume in its analysis?</p> <p>19 A Most of the time, but not all the time.</p> <p>20 Sometimes they refer to the mean value. So it was -- 1:12PM 21 when they did their calculations, they usually used a 22 P50 value.</p> <p>23 Q How do you calculate expected value?</p> <p>24 A So expected value is the value that you 25 would get if you took each value -- each estimated 1:12PM Page 50</p>
<p>1 A I'm not sure if you're asking what -- there 1:09PM 2 is a mean, I talked about P50 but there's also a mean 3 as well. It's a mathematical term.</p> <p>4 So a mean is if you average up the 5 probability and the value of each and you add them 1:09PM 6 you will up and you look at where the middle of the 7 distribution is, that would be the mean.</p> <p>8 If you mean what does risk mean, risk just 9 represents the likelihood of occurrence.</p> <p>10 Q And do you view risked mean as 1:10PM 11 interchangeable with a P50?</p> <p>12 A No.</p> <p>13 Q How are they different?</p> <p>14 A They are only the same if you have a perfect 15 normal distribution. By normal distribution I mean 1:10PM 16 it's symmetric on either side and it follows a typical 17 mathematical exponential kind of distribution.</p> <p>18 Not all distributions follow that. In the 19 oil and gas industry, not all parameters follow 20 that. 1:10PM</p> <p>21 So the only time that the mean and that 22 the P50 would be -- they are usually in the ballpark 23 of each other, but there are certain prospects and 24 certain opportunities where they are quite a bit 25 different. 1:11PM</p>	<p>1 value times its risk and you were to add it up. 1:12PM 2 So if I had a value of something that had 3 a 10 percent likelihood of being one number or 4 50 percent likelihood of being another and a 5 90 percent likelihood of being a third, I could 1:13PM 6 weight each of those values by their risk 7 probability and then add them up together and 8 divide.</p> <p>9 So that would give you then a risk value.</p> <p>10 And the reality is you can do that mathematically 1:13PM 11 across the entire curve or you can estimate it just 12 from a few values.</p> <p>13 Q Are the P90, P10 and P50 incorporated into 14 the expected value calculation?</p> <p>15 A In a -- they are included -- they are 1:13PM 16 accounted for. I won't say they are necessarily 17 included because it depends on how you do the 18 calculation.</p> <p>19 Q Okay. Elaborate on that. What do you 20 mean by "it depends on how you do the calculation"? 1:14PM</p> <p>21 A Well, if you're just doing a quick 22 calculation you, can do it just from the three values, 23 right, P10, P50, P90.</p> <p>24 If you actually calculate a probability 25 distribution for volumes, which might be a very 1:14PM Page 51</p>

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1 complex looking function, then you would actually 2 add it up mathematically in a computer. 3 So you would actually integrate under that 4 curve, so that would give you a more accurate 5 estimate. 1:14PM	1:14PM	1 have oils that have very, very little gas, you can 2 have oils that have a great deal of gas. 3 The oil at Shenandoah actually had a 4 surprisingly high amount of gas dissolved in it for 5 reservoirs of the same age and depth. 1:17PM	1:17PM
6 People who do simple calculations 7 sometimes just do it with the three values, P10, 8 P50, P90. 9 Q Are costs incorporated into the expected 10 value calculation? 1:14PM	1:14PM	6 So it was a little usual. 7 Q Do you know how much of a difference it 8 was in this case? 9 A I think it was around -- the gas-to-oil 10 ratio was around 12 to 1500. 1:18PM	1:18PM
11 A Costs should be included into it if you want 12 expected values because you have expected volumes and 13 you should calculate what the costs would be if you 14 were to pursue each of those expected volumes. 15 Not very many companies do that. A few 16 do. And in my experience looking at Anadarko is 17 that they did not do that, they did expected values 18 usually using one of their P50 or mean values. 19 So they didn't necessarily calculate value 20 for P10 or for P90. 1:15PM	1:15PM	11 Q In log-normal distributions, is it 12 inappropriate to interchange those two terms? 13 A Well, no, it's not -- a normal distribution 14 is a Gaussian and a log-normal distribution is a 15 distribution that is logarithmic on one side and a 16 Gaussian on the other. 1:18PM	1:18PM
21 Q So is the P -- what about PIR10, is that 22 predicated on the P50? 23 A At Anadarko, the calculations that I saw 24 were predominantly based upon either the P50 or the 25 mean and the PIR of 10 would be a profit investment 1:16PM	1:16PM	17 And a log-log distribution is one that's 18 logarithmic on both axes. 19 So if you just said "a logarithmic 20 distribution" and you didn't say anything else, 21 people would assume you meant a log-normal 22 distribution. 23 But there are log-log distributions. So, 24 for instance, permeability and porosity are 25 sometimes log-log. 1:19PM	1:19PM
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1 ratio at a 10 percent inflation factor. 1:16PM 2 Q So did Anadarko assess the PIR10 using P50 3 alone? 4 A Not always. But usually it looked to me 5 like they substituted and did it based on the mean. 1:16PM 6 They didn't do it on an expected value 7 basis including everything from P10 to P90. They 8 only did it on the P50 value for the most part. 9 Q What is the difference between MMBO and 10 MMBOE? 1:16PM 11 A MMBO is millions of barrels of oil and MMBOE 12 is millions of barrels of oil equivalent. Millions of 13 barrels of oil equivalent takes into account the 14 expected gas that will come out of solution. 15 And so the gas in terms of heat value 1:17PM 16 usually equates by about a factor of six, give or 17 take a little bit. 18 So you would convert millions of cubic 19 feet of gas into barrels of oil by dividing it by a 20 certain factor. And that just gives you a way of 21 adding up volumetrics. 22 Q How big of a difference can there be, or 23 in this case how much of a difference was there? 24 A How much of a difference in general depends 25 upon how much gas is dissolved in the oil. You can 1:17PM	1:16PM	1 Q So the answer is no? 1:19PM 2 A Correct, the answer is no, you cannot just 3 interchange them. 4 Q So I would like to run through some of 5 your career experience. We did it at a high level. 1:19PM 6 Now I would like to ask you some more detailed 7 questions. 8 From 1981 to 1983, you were a seismic 9 processing geophysicist? 10 A Yes. 1:19PM 11 Q And from '83 to '88, you were a senior 12 geophysicist and seismic land acquisition crew 13 chief? 14 A Yes. 15 Q Eighty-eight to '89, you were a senior 1:19PM 16 geophysical interpreter in coastal California? 17 A Yes. 18 Q So from '81 to '92, you worked exclusively 19 as a geophysicist; correct? 20 A Geophysicist although by the end, actually 1:20PM 21 doing quite a bit of geology, because I had had a lot 22 of the geologic training by then. 23 Q Okay. So moving on into later into the 24 '90s. So '95 for '97, you were involved with the 25 Shell Enchilada field as the lead staff geophysical 1:20PM	1:20PM
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1 interpreter? 1:20PM	1 engineer building the models for the subsurface. 1:23PM	
2 A Yes. So basically I ran a team, a small	2 But then I was also responsible for the	
3 team of five subsurface people of which our job was to	3 construction and installation of the offshore	
4 evaluate the field and the volumes and to build a	4 platform, so I had a construction crew working in	
5 development plan for it. 1:20PM	5 South Louisiana building a 750-foot tall steel 1:23PM	
6 Q So you were the geophysicist; right?	6 structure that would seat on the seafloor and	
7 A I had technical responsibility for the	7 building the top sides.	
8 geophysics and overall responsibility for generating	8 And then responsible for getting it towed	
9 the plan, yes.	9 out, installed, working with the drilling company to	
10 Q Okay. Let's talk about your personal 1:21PM	10 put the drilling rig on it, to start drilling the 1:24PM	
11 role. So you mapped the seismic; is that right?	11 wells and to hook up the pipelines, including	
12 A Yes.	12 negotiating the tara freight on the pipelines that	
13 Q Were there any other geophysical tools	13 we would feed our oil into.	
14 that you used?	14 Q And did you -- were you responsible for	
15 A Well, I used quite a few. So I helped 1:21PM	15 the geophysics on the project? 1:24PM	
16 guide -- even though I wasn't doing the seismic	16 A Not directly, no. I had a geophysicist	
17 processing, I had enough seismic processing experience	17 working for me.	
18 that I fed back a lot of recommendations and	18 Q And there was an engineer who led the risk	
19 information to the people doing the seismic	19 assessment and economic analysis of that field?	
20 processing, including building a salt model and a 1:21PM	20 A Under my supervision, yes. 1:24PM	
21 velocity model so they could reprocess the seismic	21 Q You did not perform those tasks	
22 data.	22 personally; right?	
23 I built the inputs for the reservoir model	23 A Practically -- I did not do a lot of the	
24 for the reservoir engineer that was working with us.	24 button pushing, but they were young people and so I	
25 I worked closely with the geologists to 1:21PM	25 had to work with them very closely to make sure that 1:24PM	
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1 define the stratigraphy of the basin and I generated 1:22PM	1 they got the evaluations done right, yes. 1:24PM	
2 both -- a number of papers, one of which won an	2 Q But yes, it was an engineer that performed	
3 award on Enchilada. And I also generated a	3 those tasks; correct?	
4 ten-minute video that was used for public to -- was	4 A Correct.	
5 made available to the public when the Enchilada 1:22PM	5 Q Asphaltene was not a significant risk at 1:25PM	
6 platform was rolled out to sea.	6 Cinnamon; right?	
7 Q So that covers what you personally did on	7 A No.	
8 that project; right?	8 Q Do you recall what the AOP of the oils	
9 A Yes.	9 were?	
10 Q All right. So from '97 to '98, you were 1:22PM	10 A At Cinnamon? 1:25PM	
11 the offshore development project manager for	11 Q Yes.	
12 Cinnamon?	12 A They were negligible. They weren't worth --	
13 A Yes.	13 the bigger issue at Cinnamon was waxes.	
14 Q At some later point not during this	14 Q There wasn't occasion for asphaltene	
15 deposition, you can explain to me all the -- how you 1:22PM	15 mitigation then in that field there; right? 1:25PM	
16 name these fields, but --	16 A No.	
17 A Maybe when we go off, I'll tell you how they	17 Q From '98 to 2002, you were working on a	
18 are done.	18 multidisciplinary team in the GoM?	
19 Q Okay. So what was your personal	19 A It was principally in the Gulf of Mexico,	
20 responsibility on this project? 1:23PM	20 but it started expanding. 1:26PM	
21 A So I was the offshore project manager. So I	21 But yes, I was working deepwater in the	
22 was responsible for an office team that was doing what	22 Gulf of Mexico but then with offering advice to	
23 I had done and what my team had done at Enchilada but	23 other deepwater plays around the world.	
24 they were doing it for Cinnamon. I had a team of a	24 Q So as the geophysicist, did you focus on	
25 geologist, geophysicist, petrophysicist, reservoir 1:23PM	25 the seismic? 1:26PM	
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1 they got the evaluations done right, yes. 1:24PM	Page 61	

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1 A I focused a lot on the seismic. In that 1:26PM	1 A I just remember the pressures we talked 1:29PM
2 period of time there was a significant number of --	2 about now. Obviously the pressures that we were
3 which years, just to be sure?	3 talking about in these wells were not at the extreme
4 Q '98 to 2002.	4 pressures, high pressures they were talking about with
5 A Oh, '98 to 2002? 1:26PM	5 Shenandoah. 1:29PM
6 Q Yes.	6 But the dropout pressure, if I remember
7 A Okay. '98 to 2002, I was working mostly	7 right, was on the order of around 3 to 4,000 psi
8 around a multidisciplinary team that was charged with	8 were the kind of dropout pressures we were typically
9 finding and risking and calculating volumes for what	9 looking at in terms of asphaltenes.
10 we would call non-amplitude supported prospects or 1:26PM	10 Q Between 2002 and 2005, you were a global 1:29PM
11 prospects that were not very obvious.	11 deepwater technical advisor?
12 And so it was -- a lot of it was in the	12 A Right. So during that period I would fly
13 Gulf of Mexico and also with input to other places	13 around the world and do training and risk assessments
14 in the world, but yes.	14 for all the deepwater plays for Shell around the
15 Q You had an engineer on that team? 1:27PM	15 world. 1:29PM
16 A Yes, I did.	16 Q Again, this is using Shell's proprietary
17 Q And the engineer on that team was	17 system?
18 responsible for evaluating recovery factor and	18 A Right.
19 running economics?	19 Q Were you also involved with a Shell global
20 A Yes. 1:27PM	20 quantitative integrated valuation team? 1:30PM
21 Q And that was not your role; correct?	21 A Yes, that was a team that was kind of like a
22 A My role was to supervise it and to make sure	22 hit team that would -- that I led that would go into
23 that those calculations were being done in accordance	23 an area and over the period of a month help them
24 with the proper Shell methodologies.	24 organize, evaluate and rank the portfolio of
25 Q Right. That's the Shell proprietary 1:27PM	25 opportunities. 1:30PM
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1 system? 1:27PM	1 Q Was this called a QIE team? 1:30PM
2 A Right. So would I sit on a -- I would sit	2 A Yes.
3 on a risk assessment team, much like the RCT that	3 Q What quantitative data did that team
4 Anadarko had, and evaluate many of them.	4 evaluate?
5 Q Anadarko didn't use that Shell system; 1:27PM	5 A Could you rephrase the question? 1:30PM
6 right?	6 Q I believe -- I believe the name of the
7 A No.	7 team is quantitative integrated evaluation team.
8 Q Do you recall any projects that you were	8 A Right.
9 personally involved in asphaltene mitigation during	9 Q Was there certain quantitative data that
10 this time? 1:28PM	10 the team evaluated? 1:31PM
11 A During that period of time or later than	11 A Yes, so this team would build a
12 that?	12 multidimensional subsurface model that, at the
13 Q During that time.	13 reservoir, existed at a reservoir scale but overall
14 A Till 2002, I have to think.	14 also existed at a geologic scale or even a basin
15 We -- we did encounter some -- we did 1:28PM	15 scale. 1:31PM
16 drill some wells that encountered asphaltenes, but	16 So it was a multidimensional model that
17 they weren't developed that year. They were	17 incorporated all the data. That's why it was called
18 developed quite a bit later, so -- and mitigation	18 integrated.
19 was put in.	19 So it incorporated all the seismic
20 But we were aware of asphaltenes, we had 1:28PM	20 information, it incorporated all the geologic 1:31PM
21 considered them and they were something that was in	21 information and it incorporated all of the well and
22 the conversation already as to how we would handle	22 reservoir information and it did it at the level,
23 if a development -- go ahead.	23 very detailed obviously at the reservoir and at a
24 Q I'm sorry. What was the AOP of those	24 much cruder level at the entire basin scale.
25 oils? 1:28PM	25 So it was a multi-scaled model. 1:32PM
Page 63	
1 system? 1:27PM	1 Q Was this called a QIE team? 1:30PM
2 A Right. So would I sit on a -- I would sit	2 A Yes.
3 on a risk assessment team, much like the RCT that	3 Q What quantitative data did that team
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15 We -- we did encounter some -- we did 1:28PM	15 scale. 1:31PM
16 drill some wells that encountered asphaltenes, but	16 So it was a multidimensional model that
17 they weren't developed that year. They were	17 incorporated all the data. That's why it was called
18 developed quite a bit later, so -- and mitigation	18 integrated.
19 was put in.	19 So it incorporated all the seismic
20 But we were aware of asphaltenes, we had 1:28PM	20 information, it incorporated all the geologic 1:31PM
21 considered them and they were something that was in	21 information and it incorporated all of the well and
22 the conversation already as to how we would handle	22 reservoir information and it did it at the level,
23 if a development -- go ahead.	23 very detailed obviously at the reservoir and at a
24 Q I'm sorry. What was the AOP of those	24 much cruder level at the entire basin scale.
25 oils? 1:28PM	25 So it was a multi-scaled model. 1:32PM
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1	Q	Did the QIE team do reserve estimation?	1:32PM	1	A	As a consultant, I use a methodology which	1:34PM
2	A	Yes.		2		is a combination of both my own experiences, the	
3	Q	On probabilistic basis?		3		things I learned at Shell and the things I learned	
4	A	Both probabilistic and deterministic.		4		using our kinds of volumetric risking technologies	
5	Q	What was your personal role in that work?	1:32PM	5		5 that I have seen over my career.	1:35PM
6	A	My personal role was to teach the		6	Q	When you say your experience at Shell, are	
7		methodology to ensure it was being followed and to QC		7		you talking about prior to the revelation of	
8		the results of the team.		8		8 overstatement or what changed afterwards?	
9	Q	Again, using Shell's proprietary system?		9	A	Well, the estimation of volumes and the	
10	A	Yes.	1:32PM	10		10 risking of those volumes did not change substantially.	1:35PM
11	Q	And the QIE is not deployed at Anadarko;		11		11 What changed was the reporting of	
12		right?		12		12 reserves. So volumes which were not reserves before	
13	A	No, it is not.		13		13 that are had been reported as reserves. That's why	
14	Q	Now, in 2004 you were the head of global		14		14 they were overstated.	
15		training for deepwater risk assessment; is that	1:32PM	15		15 It's not that the volumes did not exist,	1:35PM
16		right?		16		16 it's just that there was no plan to develop them, so	
17	A	Yes.		17		17 you can't report them as reserves.	
18	Q	So fairly senior position within the		18	Q	18 So that aspect of Shell's proprietary	
19		company by that point?		19		19 approach did not change?	
20	A	Yes.	1:33PM	20	A	20 No.	1:36PM
21	Q	So as a senior person at the company, were		21	Q	21 Okay. So between 2005 and 2008, you were	
22		you aware that in 2004, Shell revealed it had		22		22 a seismic manager; right?	
23		overstated its reserves by 3.9 billion BOE?		23	A	23 Yes, in 2005 Hurricane Katrina wiped out the	
24	A	I became aware of it.		24		24 Shell office in New Orleans and there were some very	
25	Q	And so it's an overstatement of about	1:33PM	25		25 substantial lease sales coming up in the Gulf of	1:36PM
							Page 68
1	20 percent?		1:33PM	1		1 Mexico within three to four years, and so I was yanked	1:36PM
2	A	Yes, it was a -- it was an overstatement		2		2 off of the existing role that I was and brought in to	
3		that there was -- by 20 percent, that's correct. Due		3		3 manage as exploration seismic manager for the Gulf of	
4		to discovered volumes that were never taken forward to		4		4 Mexico to prepare for the upcoming lease sales and	
5		be declared reserves.	1:33PM	5		5 transferred to Houston.	1:36PM
6	Q	That prompted an SEC investigation; right?		6	Q	6 Okay. So at that point you were no longer	
7	A	I believe so.		7		7 personally interpreting the seismic data; right?	
8	Q	And the SEC accused Shell of being		8	A	8 Actually, I spent quite a bit of time	
9		excessively permissive on its reserve estimations?		9		9 interpreting seismic data because I had a team of	
10	A	Yes. I don't know what the SEC finally	1:33PM	10		10 about 130, 150 people working hard on developing an	1:37PM
11		ruled. It did not involve any of the things I was		11		11 integrated seismic image of the entire Gulf of Mexico.	
12		working on, so...		12		12 So all the little seismic data sets shot	
13	Q	Were you aware of the allegations?		13		13 all over the place, I was responsible for buying	
14	A	I was aware of them.		14		14 seismic that would fill them in. So I would sit	
15	Q	Okay. And did Shell change its	1:34PM	15		15 there and sit with interpreters and interpret	1:37PM
16		methodology after the investigation or litigation?		16		16 seismic data.	
17	A	Shell changed its methodology in what you		17		17 We were responsible for building the salt	
18		report as reserves, Shell did not change its		18		18 interpretation across the entire Gulf of Mexico and	
19		methodology for how it calculated volumes or risking.		19		19 we were responsible for -- actually proposed a new	
20		It changed its reporting requirements and	1:34PM	20		20 seismic acquisition method which was picked up by	1:37PM
21		did it very significantly. Because we did reserves		21		21 the industry and grew quite a bit after that, the	
22		training at all levels of the company for many		22		22 idea of shooting wide-azimuth seismic.	
23		years, probably still do.		23	Q	23 So you sat with the people who were	
24	Q	Do you continue to use this methodology as		24		24 interpreting the seismic; right?	
25		a consultant?	1:34PM	25	A	25 Yes, I sat with them and looked at the	1:38PM
							Page 69

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1 workstation and interpreted the data next to them, 1:38PM	1 A Correct. 1:41PM
2 yes.	2 Q What was your responsibility there?
3 Q That project was seismic focused; right?	3 A So I ran a research team of approximately 25
4 You didn't run econ analysis on those -- that	4 people, 12 of which were in Houston in the U.S. and 13
5 seismic project? 1:38PM	5 were in the Netherlands. 1:41PM
6 A I was actually on the leadership team that	6 And our job was multifold. We were
7 then, when it came time for the lease sales, we had to	7 looking at methodologies to monitor how fluids moved
8 evaluate the potential economics of every prospect and	8 in a field.
9 every fault block that was up for sale so that we	9 So we would we came up with systems that
10 could make a suitable bid at the lease sales. 1:38PM	10 would watch oil move, would watch gas move, would 1:41PM
11 So I sat on that leadership team, yes.	11 watch water move, would watch steam move, would
12 Q The leadership team, but you didn't do the	12 watch chemicals move.
13 underlying runs?	13 We came up with technologies that involved
14 A No, we had people who would run -- we had	14 monitoring them with repeat seismic data to
15 people that would run all the economic for every one 1:38PM	15 monitoring them with distributed acoustic fiber data 1:42PM
16 of the prospects.	16 in wells with vertical seismic profiles to
17 Q From there you were in Nigeria; right?	17 monitoring them on an hourly basis with permanent
18 A Yes, 2008 I when to Nigeria as the	18 systems that were continuous, running -- buried in
19 Sub-Saharan geophysics manager.	19 the earth.
20 Q And so that was your role as a geophysics 1:39PM	20 So we had a number of -- also monitoring 1:42PM
21 manager?	21 the deflection of the seafloor as production was
22 A Well, it was actually more than geophysics	22 done or monitoring the change in gravity due to
23 because I was in -- also in charge of -- it was	23 extraction of fluids.
24 geophysics where geophysics was needed, but it was	24 So we had a whole series of technologies
25 more reservoir engineering and planning for deepwater 1:39PM	25 we were monitoring production with. 1:42PM
Page 70	Page 72
1 because Shell was -- needed someone to make a proposal 1:39PM	1 Q From there you left Shell; right? 1:43PM
2 as to how to develop a number of discoveries in	2 A Yes, I took full retirement.
3 deepwater.	3 Q You founded your geophysical company?
4 So I kind of like supervised the team who	4 A Yes.
5 was doing the volumetrics, the risking and the 1:39PM	5 Q Who are your clients? 1:43PM
6 economics.	6 A So I had a range of clients, one of my
7 Q Right. So there were folks running those	7 clients continuously has been Shell, who hired me back
8 analyses?	8 immediately as a consultant. So I've been doing that
9 A Correct.	9 and still -- they're still a client of mine. I have
10 Q Did you -- what work, if any, did you 1:40PM	10 had a number of consultants in the oil and gas 1:43PM
11 personally perform in preparing reserve reports?	11 industry.
12 A Well, when I was working at Gulf of Mexico,	12 I've had a few consultants that were
13 I would -- certainly when I was a project manager at	13 investment firms who needed information about
14 Enchilada and at Cinnamon, I was directly responsible	14 expectations about what will happen in the oil and
15 for the reserve reports for those field, right. 1:40PM	15 gas industry. 1:43PM
16 So would I sit there with a senior reserve	16 Then I had a number of companies who have
17 person and generate the report that we would use for	17 equipment from an engineering perspective that I am
18 those fields.	18 very familiar with that hired me around patents and
19 After that --	19 patent issues. So it's a range of clients. I try
20 Q I'm sorry, my question was about Nigeria. 1:40PM	20 not to work too hard. 1:44PM
21 A Oh, in Nigeria, I did not -- I had no role	21 Q All right. Let's turn to --
22 in generating the reserve reports.	22 MS. JENSEN: I'm going to mark an exhibit
23 Q Okay. Between 2012 and 2014, you were	23 here. So bear with me.
24 involved in research on reservoir surveillance;	24 You should be able to see what we've
25 right? 1:41PM	25 marked for identification as Exhibit 528. 1:45PM
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1 (Whereupon, Exhibit 528 was marked for 2 identification.)	1:45PM	1 A Under -- 1:48PM 2 Q That area within Anadarko? 3 A No, I'm not familiar with different areas of 4 storage at Anadarko.
3 MS. JENSEN: This, for the record, is a 4 native file produced by the defendants in this case 5 with the Bates number APC-01314375.	1:45PM	5 Q I'm talking about different groups. 1:48PM 6 A Which group was it with? 7 Q Fold belt. 8 A Full? 9 Q Fold belt?
6 THE WITNESS: I see it.		10 A Oh, fold belt, yes. I wasn't familiar with 1:48PM 11 that, but I'm a little surprised because this would 12 not typically be considered being in the fold belt. 13 But okay.
7 BY MS. JENSEN:		14 Q Now it's titled "Shenandoah: Sizing It 15 Right a Retrospective" from July 8th, 2017. 1:49PM 16 This isn't long after Shenandoah was 17 written off; correct?
8 Q Have you seen this document before?		18 A I don't believe Shenandoah was written off. 19 So I think -- but I think the date is correct.
9 A I'm trying to get the slide bar to work.		20 Q So you're not familiar with Shenandoah 1:49PM 21 being written off at Anadarko?
10 Q So this time -- 1:46PM		22 A Shenandoah took write-offs, but they didn't 23 write off the entire field.
11 A I recognize the first page. I believe this 12 was from a presentation by Anadarko internally.		24 Q Okay. So it's your testimony that 25 Anadarko did not write off the entire field? 1:49PM Page 74
13 Q So you've seen this before?		Page 74
14 A I think so. I can't cannot -- I haven't -- 15 well, again, this looks like ones you have to flip 1:46PM 16 through the slide one at a time. But yes, it looks 17 familiar.		18 A I don't believe Shenandoah was written off. 19 So I think -- but I think the date is correct.
18 Q And so for the record, the custodian of 19 this document, even though you can't see it on the 20 document itself, is Paul Chandler. 1:46PM		20 Q So you're not familiar with Shenandoah 1:49PM 21 being written off at Anadarko?
21 Do you know who he is?		22 A Shenandoah took write-offs, but they didn't 23 write off the entire field.
22 A I do.		24 Q Okay. So it's your testimony that 25 Anadarko did not write off the entire field? 1:49PM Page 74
23 Q Okay. Who's Paul Chandler?		Page 74
24 A Paul Chandler was one of the, I think, 25 senior reservoir engineers I think at -- either 1:46PM		1:49PM Page 74
1 reservoir engineer or geologist on the development 1:46PM		1 A Yes. 1:49PM 2 Q Okay. And if you're wrong, does that 3 change any of your opinions?
2 side.		4 A No.
3 Q So just to clarify for you, geologist -- 4 what is the difference between a geologist and a 5 petroleum engineer? 1:47PM		5 Q You're aware what a write-off is; right? 1:50PM 6 A Yes, they took write-offs -- from my 7 awareness, they took write-offs of certain wells and 8 expenditures that had been on their books. But I 9 don't believe the field was written off to completely
6 A Well, the real difference is whatever their 7 job responsibilities are assigned to be. So in terms 8 of training, they may have come from a whole variety 9 of backgrounds.		10 to zero. So I don't recall seeing that at this point 1:50PM 11 in time.
10 But a petroleum engineer is responsible 1:47PM 11 for defining how the hydrocarbons is going to get 12 out of the reservoir and through the production 13 system, right?		12 Q Let's turn to the final slide. This one I 13 do think you have to click every time.
14 So they are responsible for things like 15 what kind of completion, what size tubing, you know, 1:47PM 16 all of the stuff that is going to get engineered 17 from the reservoir to a delivery system, a pipe 18 eventually.		14 A Yes, I kind of guessed that, so I'm up to 15 like -- the good news is you can click as fast as you 1:50PM 16 want.
19 The reservoir engineer is responsible for 20 what happens in the reservoir in terms of how do 1:48PM		17 Q I'm there. Tell me when you're there.
21 fluids move in the reservoir, how much of it will 22 move out and what rate will it move at.		18 A I'm there.
23 Q So this file was saved on Anadarko's 24 network under fold belt.		19 Q Okay. Do you see the heading here, 20 "Shenandoah - Takeaways"? 1:51PM 21 A Yes.
25 Are you familiar with that? 1:48PM		22 Q So do you understand this to be the 23 takeaways from what was learned at Shenandoah? 24 A Yes, it was a presentation that was given 25 internally in the company to talk about what their 1:51PM Page 75
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1 view looking back was. It's kind of a look-back. 1:51PM	1 Before Shen 3, development had put faults 1:54PM
2 Q A look-back or a lessons learned; right? 1:51PM	2 on the map that exploration had not put on their 1:54PM
3 A Yes, lessons learned would be a little 1:51PM	3 map.
4 different, but I would call it a look-back. 1:51PM	4 Q So the second line, "If you have 1:54PM
5 Q Okay. Well, the first line here, "Never 1:51PM	5 undesirable or inclusive data, don't ignore it. 1:54PM
6 discount an interpretation because it seems wrong or 1:51PM	6 Factor it into your range of uncertainty."
7 different. All interpretations are wrong until 1:51PM	7 So this indicates that from Paul 1:54PM
8 proven otherwise." 1:51PM	8 Chandler's view, that they -- that the company had 1:54PM
9 Would that be a lesson learned? 1:51PM	9 ignored undesirable or inconclusive data such as 1:54PM
10 A Usually a lesson learned has a 1:51PM	10 faulting; right? 1:54PM
11 recommendation for the future. 1:51PM	11 MS. PHILLIPS: Objection as to form.
12 So you could -- because I actually work in 1:51PM	12 THE WITNESS: I believe exploration was 1:54PM
13 capturing lessons learned. 1:51PM	13 taking faulting into account, because they were 1:54PM
14 But in terms of what happened, I would 1:52PM	14 accounting for it in lowering their recovery factor.
15 agree with that. 1:52PM	15 What they didn't do was put faults on the 1:55PM
16 Q It says, "Never discount an 1:52PM	16 map which would later turn out to be wrong.
17 interpretation"; right? That's kind of an 1:52PM	17 BY MS. JENSEN:
18 instruction for the future? 1:52PM	18 Q Okay. So from this perspective, so I 1:55PM
19 A Correct. 1:52PM	19 understand that you've got your view on it, but this 1:55PM
20 Q That's it; right? 1:52PM	20 indicates that the lessons learned was that the 1:55PM
21 A Okay. 1:52PM	21 undesirable data should be factored into the range 1:55PM
22 Q And the discount interpretations here were 1:52PM	22 of uncertainty?
23 the predevelopment's faulted maps; right? 1:52PM	23 MS. PHILLIPS: Objection as to form.
24 A The discounted interpretations are every 1:52PM	24 THE WITNESS: Yes, this doesn't say what 1:55PM
25 interpretation because the final interpretation is yet 1:52PM	25 the undesirable or inconclusive data is. 1:55PM
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1 to be -- yet to be determined. 1:52PM	1 BY MS. JENSEN: 1:55PM
2 Q And Paul Chandler had interpretations on 1:52PM	2 Q Right. And you're not aware of what Paul 1:55PM
3 Shenandoah pretty early on; right? 1:52PM	3 Chandler was advocating for throughout the class 1:55PM
4 A Yes, he did. 1:52PM	4 period in terms of the data?
5 Q And his were discounted; correct? 1:52PM	5 A No, I'm aware of what Paul Chandler was 1:55PM
6 A Not sure they were discounted. I think they 1:52PM	6 advocating for, but just as the first line said, he 1:55PM
7 were considered, but there are many interpretations 1:52PM	7 was advocating for his interpretation but all 1:55PM
8 and as it says, don't discount them because they are 1:52PM	8 interpretations are wrong until proven otherwise.
9 all wrong. So... 1:52PM	9 Q So let's look at Number 3,
10 Q So you are aware that in this case, the 1:53PM	10 "Compartmentalization is the bane of most deepwater 1:55PM
11 development team had faults on their maps that were 1:53PM	11 developments that fail."
12 not accepted by the company? 1:53PM	12 So this expresses the belief that 1:55PM
13 A At what time frame are you talking? 1:53PM	13 Shenandoah failed because of compartmentalization; 1:55PM
14 Q I'm talking about 2014, 2015 in 1:53PM	14 correct?
15 particular. 1:53PM	15 A Shenandoah hasn't started producing yet, so 1:56PM
16 A Yes, well, after Shen 4, the development 1:53PM	16 it's not clear whether or not it failed or not. But 1:56PM
17 team took over, so whatever faults they had on the map 1:53PM	17 compartmentalization is an issue that has to be 1:56PM
18 were accepted. 1:53PM	18 accounted for, yes.
19 Q So I'm talking about the time frame of 1:53PM	19 Q So that's not my question, though. If you 1:56PM
20 early -- of 2014 through 2015, so the answer to my 1:53PM	20 could focus on my question. 1:56PM
21 question is yes; right? 1:53PM	21 In this instance he's saying -- expressing 1:56PM
22 A So after Shen 3, exploration put a fault on 1:53PM	22 the view that Shenandoah failed at that time because 1:56PM
23 their map before -- and exploration was in charge of 1:53PM	23 of compartmentalization; correct?
24 the development -- in charge of the evaluation, the 1:53PM	24 MS. PHILLIPS: Objection as to form.
25 appraisal. 1:54PM	25 THE WITNESS: No, he just said 1:56PM
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1 to be -- yet to be determined. 1:52PM	1 BY MS. JENSEN: 1:55PM
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23 their map before -- and exploration was in charge of 1:53PM	23 of compartmentalization; correct?
24 the development -- in charge of the evaluation, the 1:53PM	24 MS. PHILLIPS: Objection as to form.
25 appraisal. 1:54PM	25 THE WITNESS: No, he just said 1:56PM
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1 compartmentalization is the bane of most deepwater 2 developments that fail. 3 So he doesn't characterize Shenandoah as 4 being one of those or not. 5 BY MS. JENSEN: 1:56PM 6 Q Do you see at the bottom of this page -- I 7 think you said earlier that you didn't think that 8 Anadarko wrote off the field. 9 Do you see the reference here to May 2017, 10 Anadarko wrote off \$902 million associated with 11 Shenandoah? 12 A Yes. 13 Q Okay. And so does that refresh your 14 recollection that Anadarko wrote off the entire 15 field? 1:57PM 16 A I don't see there -- it says "associated 17 with Shenandoah," it doesn't say 902 million 18 Shenandoah field. So this is 902 million associated 19 with it. So it's part of it, yes, they did write off 20 part of it. 1:57PM 21 Q So you think there's some part of the 22 field that was not written off? So in other words, 23 you think there was some amount of money that goes 24 beyond \$902 million? 25 A Yes. 1:57PM	1:56PM	1 (Recess taken.) 2:00PM 2 THE VIDEOGRAPHER: Back on the record. 3 It's 2:02 p.m. 4 BY MS. JENSEN: 5 Q Dr. Detomo, would you please turn to 2:02PM 6 slide 3 of this same document. So it's going to 7 require some quick clicking. 8 A You don't think you can just click on the 9 end and it go to the front? 10 Q If you can do that, that's fine. I don't 2:02PM 11 think so, though. 12 A No, you're right. 13 Slide 3. 14 Q Okay. So do you see -- do you see the 15 same thing I see, which is "Shenandoah - Historic 2:03PM 16 Overview"? 17 A Yes. 18 Q And there are several stars, the biggest 19 star is on the right-hand side of the slide? 20 A Yes. 2:03PM 21 Q And it's a slide -- again, this is in 22 2017, but then there's a -- also the year 2018 is 23 listed in this timeline? 24 A Yes. 25 Q Okay. And under it says, "APC elects to 2:03PM Page 82
1 Q And what is that based on? 1:57PM 2 A That's based upon the fact that the -- 3 Anadarko did not write off all of the wells. They did 4 not write off -- they wrote off a series of wells, 5 okay, but not all of it. 1:58PM 6 So they still thought the field had value. 7 They just were not prepared to pursue it. 8 Q And so if they did write off the entire 9 amount, that would indicate the converse, which is 10 that they thought that Shenandoah had no value; 1:58PM 11 correct? 12 MS. PHILLIPS: Objection. 13 THE WITNESS: No -- sorry. If they wrote 14 off the whole thing eventually, it just means that 15 they did not have the means to pursue it. 1:58PM 16 BY MS. JENSEN: 17 Q But your testimony is they did not write 18 off the entire thing? 19 A At this point in May of 2017, they had not 20 written off the entire thing. 1:58PM 21 Q Bear with me for a moment. 22 MS. JENSEN: I apologize, we need to go 23 off the record for a moment. 24 THE VIDEOGRAPHER: Off the record. It's 25 1:59 p.m. 2:00PM	Page 83	1 withdraw from project completely due to reserve size 2:03PM 2 and risk." 3 Do you see that? 4 A Yes. 5 Q Okay. No reason to dispute that; correct? 2:03PM 6 A No. 7 Q You can set this aside. 8 A I should point out that was way after May of 9 2017. 10 Q That didn't refer to a write-down, did it? 2:04PM 11 A I'm referring back to the last question you 12 had asked before we went off. You had asked about May 13 2017. 14 Q Right. And this one under 2018, it 15 doesn't say anything about write-off, does it? 2:04PM 16 A No, but in November of 2017, they proposed 17 Well Number 7, so... 18 Q We're kind of running off course here. 19 So, Dr. Detomo, if you could just focus on my 20 questions, answer those questions. 2:04PM 21 A Okay. 22 Q Let's try to kind of stick with the 23 program so that we don't get lost on frolics and 24 detours; okay? 25 A Okay. 2:04PM Page 85

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1 Q Let's turn now to slide 55. 2:04PM	1 A Yes, that's what the chart says. 2:14PM
2 A You're going to wear out my finger.	2 Q Do you agree that after Shen 3 and Yucatan
3 Q Yes, mine too.	3 were drilled, the mean resource reduced to
4 A Yes.	4 920 MMBOE?
5 Q Do you see here there is a chart and it 2:05PM	5 A Yes, that's what is on this slide. 2:14PM
6 says, "Shenandoah Resource Estimate Through Time"?	6 Q And the fault model goes down to
7 A Yes.	7 740 MMBOE?
8 Q Do you recognize this to be an evolution	8 A Yes.
9 of Shenandoah's resource size over time?	9 Q Okay. After Shen 4, the joint estimate
10 A Yes. 2:05PM	10 post RCT review was 425 MMBOE? 2:14PM
11 Q What is the relationship of a mean -- of	11 A Wait a minute. I'm working my way down.
12 the mean of a probability distribution? This would	12 So the fault model post Shen 3, Yuc 2 was
13 be the entire distribution.	13 740. The post-drill Shen 4 was 754. Fault model
14 A The mean represents the weighted average of	14 east fault block 590 and 85 percent to 550.
15 being effectively in the middle. 2:06PM	15 So joint exploration after Shen 4, 425, 2:15PM
16 Q The mean of a probability distribution,	16 yes.
17 can it be used to characterize the distribution?	17 Q And post Shen 5 goes down to 353?
18 A It's one of the ways one could characterize	18 A Correct.
19 it, yes.	19 Q And post Shen 6 goes down to 250 MMBOE?
20 Q So if the mean of a probability 2:06PM	20 A Post Shen 6 development quick-look, 249. 2:15PM
21 distribution decreases over time, it's an indication	21 Q Okay. MMBOE; right?
22 that the distribution is decreasing; correct?	22 A Excuse me. I need to check. I'm not sure
23 A It doesn't mean that the -- it depends on	23 if they aren't quoting MMBO or MMBOE. Let me check.
24 the range of the distribution, what the range of the	24 Q If you look right underneath -- it's kind
25 distribution is doing as well. 2:06PM	25 of faint but right under those bars you see gross 2:16PM
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1 Q Okay. But it can be an indication that 2:06PM	1 resource, MMBOE? 2:16PM
2 the distribution is decreasing; correct?	2 A I see MMBOE under all the bars before
3 A It can be one indication that the	3 Shen 4. But below that I don't actually see MMBOE, I
4 distribution could be decreasing.	4 just see mean and there's nothing written underneath
5 Q Okay. So looking at this chart, you see 2:06PM	5 it. 2:16PM
6 that the mean of exploration's resource distribution	6 So unless it's in a strange color and I
7 for Shenandoah was 1200 MMBOE after Shen 2? You may	7 can't see it.
8 need to zoom in.	8 Q It's in a gray.
9 A I was just looking for that.	9 A Is it in the bar? I don't see it.
10 Let me see if I can find where the zoom 2:07PM	10 Q It's right underneath them. 2:17PM
11 is. Is there a way to zoom in?	11 A Unfortunately, in my version of the view
12 MS. JENSEN: Let's go off the record.	12 graph, I see the P99, P90 mean, P10, P1 and the bar
13 THE VIDEOGRAPHER: We're off the record.	13 underneath. There's nothing on the blue in the bar,
14 It's 2:07 p.m.	14 so PowerPoint color.
15 (Recess taken.) 2:07PM	15 Q So I'll just represent to you that below 2:17PM
16 THE VIDEOGRAPHER: Back on the record.	16 those bars in gray is gross resources MMBOE.
17 It's 2:13 p.m.	17 A Okay. If it says MMBOE.
18 BY MS. JENSEN:	18 Q You're aware that after Shen 6, it went
19 Q Welcome back. I believe that you can see	19 down to 150 MMBO?
20 the numbers now on this chart. So I'll ask you 2:13PM	20 A I'm aware that after Shen 6, they -- that it 2:17PM
21 about some of them.	21 did lower -- after they went ahead and got all the
22 So looking at the bars in this chart, kind	22 data from Shen 6, Shen 6 sidetrack, et cetera, that
23 of in the middle of this slide, do you agree that	23 they it did go down again. So I don't recall exactly
24 the mean of exploration's resource distribution was	24 what the number was.
25 1200 MMBOE post Shen 2? 2:14PM	25 Q In any event, we're talking a drop in the 2:18PM
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<p>1 mean resource from 1200 MMBOE to less than 200 MMBOE 2:18PM 2 over time? 3 A Yes. 4 Q About an 85 percent reduction; right? 5 A That's the purpose of an appraisal is to 2:18PM 6 narrow the range, yes. 7 MS. JENSEN: I'm going to strike that 8 answer. It's nonresponsive. 9 Q I'm just asking you: It's 85 percent 10 reduction; right? 2:18PM 11 A Just a second. From 1200 -- 85 percent 12 would be -- yes, that's pretty close to it. I would 13 say pretty close to 85 percent, yes. 14 Q Okay. You can set this aside and back out 15 of it. 2:19PM 16 A Okay. 17 Q In your report you criticize 18 Mr. Pittenger's analysis of commerciality saying the 19 calculation of expected value alone is incomplete. 20 Can you define the term "expected value"? 2:19PM 21 A Yes, expected value would be -- the way I 22 would define "expected value" would be the integration 23 of the probability of occurrence times the likely 24 volume for that occurrence. 25 Q Okay. And do you have a source for that 2:19PM</p>	<p>1 probability of the 50 percent volume, multiply those 2:21PM 2 together, add them all up and divide. And that 3 would give you a crude estimate of expected value. 4 So... 5 Now, that only gives you the expected 2:22PM 6 value of volume. It doesn't give you expected value 7 in terms of what the economics look like. 8 Q So what would be the equation for expected 9 value in economics? 10 A Now, that gets a lot more complicated 2:22PM 11 because if you only have the P90 value, in other 12 words, you had a small volume, you would build a small 13 development. 14 If you had the P10, a big field, you would 15 build a big development. And so the cost for each 2:22PM 16 of those are different. 17 And I didn't see Anadarko ever doing that 18 calculation calculating what the costs for different 19 size developments for different size volumes would 20 be. 2:22PM 21 So they only did it based upon the -- 22 either the P50 or the median value. 23 Q Okay. So you're not aware of an expected 24 value equation? 25 A Expected value equation for value? 2:23PM</p>
<p>Page 90</p> <p>1 definition? Is there an industry source or 2:20PM 2 literature source you can cite? 3 A I don't have one off the top of my head. 4 But I think if you look up "expected value," that's 5 what you're going to see. 2:20PM 6 Q What is the formula for expected value? 7 A Probably the integration of the likelihood 8 times the volume normalized to the total possibility. 9 Q There is a formula; right? There is an 10 actual mathematical equation? 2:20PM 11 A There is. 12 Q And what is it? 13 A I think it's going to be an integral from 14 zero to 100 percent of the risk. So that would be a 15 value times the actual volume and then that integral 2:20PM 16 normalized by the total would be the expected value. 17 So it's going to look like an integral from zero to 18 100 times risk times that DX. 19 So yes, there is a formula for it. I 20 don't know anybody that really calculates that way, 2:21PM 21 but that is the formula. 22 The cheap and easy way do it is to take a 23 10 percent probability of the 10 percent volume, a 24 90 percent probability of the 90 percent likelihood 25 volume, which would be the P10, and the 50 percent 2:21PM</p>	<p>Page 92</p> <p>1 Q Yes. 2:23PM 2 A I could write the equation for it, but I'm 3 not aware of it ever having been done. 4 Q So what would be the equation? 5 A Okay. So for each of the -- for each of the 2:23PM 6 volumes, you have to have a development cost. So 7 for -- if you're going to do it on say every percent, 8 you would have to have a development cost. 9 So what is the development cost associated 10 with P10? What's the development cost associated 2:23PM 11 with P50? What is the development cost associated 12 with P90? What is the development cost for every 13 one of those in between, because there may be places 14 where you change the development, you might change 15 number of wells, you might change the size of the 2:23PM 16 platform, you might change the size of the pipe. 17 And then if you have a cost for every one 18 of those, then you could go through and do the 19 economics for every one of them. 20 Basically you would have to do the 2:24PM 21 economics for each of those and then add them all 22 up. 23 Q So you referred earlier to Rose & 24 Associates; right? 25 A Yes. 2:24PM</p>

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1 Q Rose & Associate is the industry leader in 2 resource assessment with uncertainty; correct? 3 A I have no knowledge of them being an 4 industry leader. There's actually, as far as I know, 5 very few companies that actually use it. 2:24PM	1 A I think you need that role. Whether or not 2:26PM 2 that's the role of the reservoir engineer or the role 3 of somebody else like an economics or a financial 4 person depends upon the company.
6 Q So you don't think it's an industry 7 leader? 8 A No, I do not. 9 MS. JENSEN: I've introduced into the 10 record a document which has been marked as 11 Exhibit 529 for identification. So you should be 12 able to see this. 13 (Whereupon, Exhibit 529 was marked for 14 identification.)	5 Q Further down into this article it talks 2:26PM 6 about the importance of running these expected value 7 equations. And it says, "If the expected value is 8 positive, the project is an investment candidate, if 9 it's negative, we're gambling. We can still invest 10 in a project with a negative expected value, but 2:27PM 11 likely we're going to lose money, and we'll 12 certainly lose if we invest in enough of them." 13 Do you agree with that statement? 14 A If you knew exactly what the commercial 15 success volume was, yes. But the problem is you don't 2:27PM 16 ever know what that value is. 17 And if you say that you are investing 18 based solely upon that value, that's also not 19 true. Because there are many other things that come 20 into account to decide whether or not you invest, 2:27PM 21 sometimes even at a loss. 22 I was involved in a project where we 23 invested in Saudi Arabia at a loss in order to have 24 country entry. So you make investments for lots of 25 different reasons. 2:28PM
15 THE WITNESS: Okay. Just a minute. 2:24PM 16 MS. JENSEN: For the record, this is an 17 article called "The Role of the Engineer in 18 Exploration: Expected Value." And this is from 19 Rose & Associates. 20 THE WITNESS: Which number? I got it. 2:25PM 21 Okay. 22 BY MS. JENSEN: 23 Q 529. 24 A 529. Got it. 25 Q Have you seen this before? 2:25PM	Page 94
1 A No. 2:25PM 2 Q So there's an expected value equation 3 here. 4 Do you see that? 5 A I do. 2:25PM 6 Q Any reason to dispute that that's the 7 equation for expected value? 8 A The thing I would argue is it's an estimate 9 of expected value and it says underneath, "It's a very 10 simple equation." 2:25PM 11 Q But otherwise, no reason to dispute? 12 A As an estimate of expected value, no, I 13 think it's fine. It has probability chance times the 14 expected value, et cetera, so... 15 Q Also in this article it talks about the 2:26PM 16 role of an engineer and says, "an engineer's role in 17 exploration is to quantify. Geoscientists make 18 interpretations of data and then engineers turn 19 those interpretations into resource and economic 20 assessments. The ultimate goal is to generate an 21 inventory of opportunities that can be high graded, 22 allowing investment in those that are the most 23 financially worthy." 24 You don't have any reason to disagree with 25 what's stated there; correct? 2:26PM	Page 94
1 A There is a reference in here to full-cycle 2:28PM 2 costs and that's the right way to run economics; 3 right? 4 A Can you tell me where you're talking about? 5 What page? 2:28PM 6 Q Yes, give me just one second. Hold on 7 just one second. I have a tech issue. Hold on. 8 Okay. It's been resolved. If you turn 9 down to Page 2 of this article. 10 A Yes. 2:29PM 11 Q So near the bottom, it talks about the NPV 12 calculation? 13 A Yes. 14 Q And it says that it "accounts for all 15 production (therefore revenue) and all costs and 2:30PM 16 expenses over the life of the field." 17 A Yes. 18 Q Okay? 19 A Yes. 20 Q So in other words, full cycle costs should 2:30PM 21 be inputted; right? 22 A Yes, but I'm getting a little -- while you 23 were waiting, I read this article, so this article 24 appears to apply to an exploration well. So I'm a 25 little confused that their calculations and their 2:30PM	Page 95

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1 equations only apply to one probability and one 2 particular volume, not a range of them. 3 Q So you can set that aside. 4 In your report you said that "the 5 calculation of expected value, alone, is 6 incomplete." 7 What do you mean by "incomplete" in that 8 context? 9 A Can you tell me where you're referencing in 10 my report? 11 Q Sure. So Paragraph 64. 12 A Fifty-four? 13 Q Sixty-four. 14 A Sixty-four. Could you ask your question 15 again then? 16 Q You said that it's incomplete, the 17 calculation of expected value alone is incomplete. 18 What did you mean? 19 A The assumption is he assumes if you do the 20 calculation at the single P50 value with the P50 cost, 21 if that doesn't meet some commercial threshold, that 22 it's not commercial. But that's not true. 23 Because you've ignored the uncertainty in 24 the range of the volumetrics and the uncertainty 25 associated with the cost.	2:30PM 2:30PM 2:31PM 2:31PM 2:31PM 2:32PM 2:32PM	1 So if I -- the way to improve the 2 economics of a project is to either sell more at a 3 higher price -- in other words, make more money -- 4 reduce cost or get it earlier. 5 Q So are you saying that the expected value 6 calculation does not take into account costs? 7 A No, the expected value here only took into 8 account one set of estimated costs and one estimated 9 volume. It did not take into account the range. 10 For instance, would Mr. Pittinger assume 11 that if I took these costs and applied it to the P10 12 value, would that be economic? And so, you know, 13 it's an incomplete analysis. 14 Q Okay. In Paragraph 68 you say that each 15 partner had their own resource number; is that 16 right, some higher, some lower? 17 A Yes, they all calculated resources 18 independently. 19 Q But all the other partner estimates of 20 Shen mean resource sizes were smaller than Anadarko 21 exploration; correct? 22 A I would have to revisit the chart showing 23 how they all compare. 24 Q Okay. In fact, the partner volumes and 25 Anadarko development were less than half of	2:34PM 2:34PM 2:34PM 2:35PM 2:35PM 2:35PM 2:36PM
1 So just because that volume might not be 2 economic with a certain set of assumptions on cost, 3 if I were to change the assumptions on cost, that 4 volume may be very economic. 5 And given the range of volume, there may 6 be many volumes that are very economic. 7 So it's an incomplete assessment of value. 8 Q And so is your critique there that you 9 think costs should be included? 10 A In order to calculate -- yes, I think in 11 order to calculate a field's -- whether or not you're 12 going to develop a field, you have to reduce the 13 uncertainty to the point that you have a high level of 14 confidence that it's going to be economic at most, if 15 not all the ranges of what the outcomes are likely to 16 be. 17 Q So how does expected value exclude or 18 include costs? 19 A Well, if you're talking about expected 20 value, the value depends upon the cost. If I 21 calculate the return on investment, the return on 22 investment has two parts -- has three parts to it. 23 One part is how much income do you get. 24 One part is how much money do you have to spend, and 25 the third part is what is the time in between those.	2:32PM 2:32PM 2:32PM 2:33PM 2:33PM 2:34PM 2:34PM 2:34PM	1 explorations estimated post Shen 3; correct? 2 A I would have to see the values for what they 3 were post Shen 3. 4 Q Okay. But sitting here, you don't have 5 any reason to dispute that; right? 6 A I don't have any reason to agree or disagree 7 with that because I don't know off the top of my head 8 the exact numbers for both of them post Shen 3. 9 Q The Anadarko exploration research 10 estimates were much higher than other partners; 11 right? 12 A I seem to recall that they were in at least 13 a number of cases higher. I don't know if they were 14 always higher or if there were times where they were 15 lower. 16 Remember, when you say resource estimates, 17 I'm not sure if you're talking about the whole range 18 of estimates or if you're talking about a P50 or a 19 P90 or a P10. 20 Q I said mean. 21 A Okay. The mean. So the mean, I think there 22 were a number of times where Anadarko's were lower 23 than at least some of the partners, yes. 24 Q Okay. Now, as to the Shenandoah partners, 25 which ones were partners during the class period?	2:36PM 2:36PM 2:36PM 2:36PM 2:36PM 2:36PM 2:37PM 2:37PM 2:37PM 2:37PM 2:37PM 2:37PM 2:37PM 2:37PM Page 98 Page 99 Page 101

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<p>1 A ConocoPhillips was a partner. Venari was a 2:37PM 2 partner. Cobalt was a partner and then Marathon was a 3 partner I think up through Shen 5.</p> <p>4 Q As to those partners, ConocoPhillips was 5 trying to sell its working interest in Shenandoah 2:38PM 6 since 2015; right?</p> <p>7 A It's not clear to me whether they were 8 trying to sell their interest or whether or not they 9 were trying to just upgrade their portfolio. I 10 believe ConocoPhillips was looking at restructuring 2:38PM 11 their portfolio to have more capital to spend 12 online -- onshore.</p> <p>13 Q You have no reason to dispute that 14 ConocoPhillips was trying to sell its working 15 interest in Shenandoah since 2015? 2:38PM</p> <p>16 A Well, they were shopping it around. But I'm 17 not sure they were actually willing to sell it unless 18 they could get -- or the value that they wanted for 19 it.</p> <p>20 Q Okay. But they were shopping it around 2:39PM 21 since 2015; right?</p> <p>22 A They did go out to the market and ask what 23 people would be willing to pay.</p> <p>24 Q Okay. Sound like semantics. But in any 25 event, okay. 2:39PM</p>	<p>1 Q I would like to turn your attention to the 2:40PM 2 last sentence in that paragraph.</p> <p>3 "Given the remaining uncertainties and the 4 significant costs and time necessary to produce such 5 discoveries," you mean oil discoveries, "decisions 2:40PM 6 are continually made during the appraisal program to 7 either: Number 1, abandon the discovery as 8 noncommercial, Number 2, continue appraising to 9 further reduce uncertainty, or Number 3, move the 10 effort to the 'development' phase." 2:41PM</p> <p>11 Is that right?</p> <p>12 A Yes.</p> <p>13 Q And so the company is constantly visiting 14 whether to abandon, continue or develop based on 15 economic considerations; correct? 2:41PM</p> <p>16 A Based upon uncertainties during the 17 appraisal. The purpose of appraisal is to reduce the 18 uncertainty.</p> <p>19 Q So the company's constantly revisiting 20 which direction to go in; right? 2:41PM</p> <p>21 A The results of the last appraisal or the 22 past appraisal drives an estimate of what additional 23 appraisal needs to be done to reduce uncertainty. You 24 can't make a commercial assessment until you've 25 finished appraisal. 2:41PM</p>
<p>Page 102</p> <p>1 So ConocoPhillips non-consented to Shen 7; 2:39PM 2 right?</p> <p>3 A Yes.</p> <p>4 Q Marathon did sell its working interest in 5 Shenandoah during the class period; correct? 2:39PM</p> <p>6 A Yes.</p> <p>7 Q And in the end, Anadarko abandoned 8 Shenandoah without making any money on Shenandoah; 9 right?</p> <p>10 A Well, they exited, so -- but I don't know 2:39PM 11 about what the final economics -- there are some 12 complications financially in there.</p> <p>13 So whether or not they actually made any 14 money, didn't make any money, you know, and where 15 that might actually have been made or not made, I 2:39PM 16 would find it doubtful, but I don't know for sure 17 because I'm not a financial person. I don't know 18 all the details of their backdoor arrangements.</p> <p>19 Q So because you're not a financial person, 20 you don't have any opinion on that? 2:40PM</p> <p>21 A I don't know whether or not they made money 22 or not.</p> <p>23 Q Okay. All right. Let's turn to 24 Paragraph 97.</p> <p>25 A Okay. 2:40PM</p>	<p>Page 104</p> <p>1 Q So is your Paragraph 97 accurate or not? 2:41PM</p> <p>2 A Yes.</p> <p>3 Q Did you examine how the expected value of 4 Shenandoah fields changed over time?</p> <p>5 A The way I would calculate expected value, I 2:42PM 6 did not do it after each one, no.</p> <p>7 Q Did you examine how Anadarko's 8 management's view of Shenandoah changed over time?</p> <p>9 A Well, exploration management's view was to 10 continue appraising and reducing uncertainty, which is 2:42PM 11 what they did.</p> <p>12 Q I'm not talking about exploration, I'm 13 talking about Anadarko's senior management.</p> <p>14 A Well, exploration's senior management was 15 driving what the decisions on exploration. 2:42PM</p> <p>16 And even when exploration was done, they 17 drove the decisions on the development team. And 18 the decision was to continue to appraise.</p> <p>19 Q So you're confining your answer to senior 20 exploration management; is that right? 2:43PM</p> <p>21 A I believe the senior management above 22 exploration could have made a decision to not -- to 23 stop at any point in time, but they did not.</p> <p>24 Q Let's turn to Paragraph 34.</p> <p>25 You refer in this paragraph to Anadarko's 2:43PM</p>

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1 public statements. 2:43PM	1 defendants were misleading about in their 2:45PM
2 A Okay.	2 statements?
3 Q Now, are you offering an opinion in this 4 case that defendants did not engage in a fraudulent 5 scheme? 2:43PM	3 A Okay. Well, just a second. I thought I had 4 a section. I wanted to find the exact wording. I 5 know -- I don't know why I can't find it. 2:46PM
6 MS. PHILLIPS: Objection to the extent it 7 calls for a legal conclusion.	6 Okay. So without looking up the exact 7 wording, to the best of my memory, one of the issues 8 was around when they made a public announcement 9 about Shen 3, they had made the announcement that
8 THE WITNESS: Yes, the only thing I 9 commented on is whether or not the facts that were 10 relayed in the public statements that I reviewed, 11 whether or not those facts were truthful or not.	10 the well had found thicker sand and I think that was 2:47PM
12 BY MS. JENSEN:	11 one of the complaints was they felt that that was 12 not accurate.
13 Q So in answer to my question, the answer is 14 no?	13 Q Any others?
15 MS. PHILLIPS: Same objection. 2:44PM	14 A I think after Shen 4, there was some 15 complaint about the fact that Shen 4 had found 2:48PM
16 THE WITNESS: The statements that they 17 made were in my opinion truthful.	16 600-plus feet of oil and then I -- those were probably 17 the two that I recall off the top of my head.
18 BY MS. JENSEN:	18 So somewhere in my report is a list of 19 each of those and you probably know where they are 20 better than I do. But I would have to look through 2:48PM
19 Q But that's not my question.	21 it to find it offhand. I guess I could look at the 22 table of contents.
20 A Okay. 2:44PM	23 Q So the allegations that you evaluated, 24 they are within the four corners of your report;
21 Q Just focus on my question.	25 correct? 2:49PM
22 A Okay, repeat your question.	Page 108
23 Q Are you offering an opinion that 24 defendants did not engage in a fraudulent scheme?	
25 MS. PHILLIPS: Same objection. 2:44PM	
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1 THE WITNESS: I'm not offering such an 2 opinion. 2:44PM	1 A Yes. 2:49PM
3 BY MS. JENSEN:	2 Q Okay. You also say that the alleged 3 omissions "are either commonly known uncertainties, 4 such as the risk of faulting, or detailed technical 5 disagreements that I would not expect to be 2:49PM
4 Q Are you offering an opinion that the 5 defendants did not engage in any deceptive business 6 practice? 2:44PM	6 disclosed."
7 MS. PHILLIPS: Objection to the extent it 8 calls for a legal conclusion.	7 That's your position; correct?
9 MS. JENSEN: That's an improper objection, 10 by the way. Go ahead. 2:44PM	8 A One wouldn't normally, in talking about --
11 THE WITNESS: I don't have any opinion as 12 to whether or not that was true. I only have an 13 opinion as to whether or not what they relayed to 14 the public was factually correct.	9 Q I'm sorry to interrupt.
15 BY MS. JENSEN: 2:45PM	10 A Go ahead. 2:49PM
16 Q And when -- the statements that you looked 17 at, those are the ones that are set forth in your 18 report; correct?	11 Q Is that a yes?
19 A Yes.	12 A Say the question again.
20 Q Now, what are the plaintiffs alleging was 21 misleading about the defendant's statements? 2:45PM	13 Q Okay. So I was quoting from your report, 14 so --
22 A You're asking me?	15 A Yes. 2:49PM
23 Q Yes.	16 Q You say that "The alleged omissions that 17 Plaintiffs identify are either commonly known 18 uncertainties, such as the risk of faulting, or 19 detailed technical disagreements that I would not 20 expect to be disclosed." 2:49PM
24 A Could you repeat that again?	21 That's your position; right?
25 Q What are the plaintiffs alleging 2:45PM	22 A Yes.
Page 107	23 Q Are there criteria for company disclosures 24 under federal securities laws?
	25 A I'm not familiar -- I'm not aware of what 2:50PM
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1 the requirements of what should be disclosed are or 2:50PM	1 uncertainties, you're talking about the phraseology 2:53PM
2 not.	2 around sand versus oil?
3 Q Okay. You're not a lawyer; right?	3 A You asked for one example. I just gave it.
4 A No.	4 Q So that's the type of example you're
5 Q Okay. You don't hold yourself out as a 2:50PM	5 talking about when you say that the omissions are 2:53PM
6 securities law expert?	6 commonly known uncertainties?
7 A No.	7 A Another omission might be that in the
8 Q Now, you refer to commonly known	8 interpretation, there's the possibility of a -- say a
9 uncertainties. What are you referring to?	9 fault nearby.
10 A In the oil and gas industry, there are 2:50PM	10 Now, if you -- 2:53PM
11 certain terms which are interpreted in a common way.	11 Q So if you --
12 So that I would -- we refer to those as commonly	12 A If you don't know the fault's there, you
13 known.	13 wouldn't disclose, oh, by the way, there may be a
14 Q Okay. So you're just referring to the	14 fault nearby.
15 fact that there's certain terms that are interpreted 2:50PM	15 Q Okay. So I think maybe we're 2:53PM
16 in a common way?	16 misunderstanding the purpose of me taking your
17 A Yes.	17 deposition.
18 Q Okay. That's all you mean by that?	18 So I'm trying to understand what it is
19 A Yes.	19 that you're referring to, but then you're using
20 Q Okay. Are there any other commonly known 2:51PM	20 words like, well, it might be this. 2:54PM
21 uncertainties that you're referring to there?	21 I'm trying to get to you tell me,
22 A Other than which ones?	22 Dr. Detomo, what are the commonly known
23 Q Well, you just referred to your definition	23 uncertainties that you're referring to in
24 of what that meant.	24 Paragraph 34? Please give me an exhaustive list.
25 A Right. So I said common -- they are 2:51PM	25 A An exhaustive list? 2:54PM
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1 commonly -- they are understood in a common way and 2:51PM	1 Q An exhaustive list? 2:54PM
2 you asked if there were any others.	2 A It would take some time for me to develop an
3 Q Okay.	3 exhaustive list. I list the ones in the other parts
4 A We did not talk about any specifically. So	4 when I respond to the particular claims at the time.
5 I don't know what the others are. 2:51PM	5 But an exhaustive list would require me 2:54PM
6 Q Right. So you tell me. That's how you	6 taking time and thought to write such a list down.
7 define that term, so I was just going off of your	7 I gave two examples, so...
8 testimony. So what are you referring to here?	8 Q So those are your two examples then in
9 A Are you asking me what are some common	9 this case?
10 terms? 2:51PM	10 A How many examples are you looking for? 2:54PM
11 Q I'm talking about your report, Dr. Detomo.	11 Q I'm looking for all of the examples that
12 So you used words, I'm trying to figure out what	12 apply to this case.
13 those words mean.	13 A Well, examples that apply to each of the
14 You say, "commonly known uncertainties."	14 disclosures that were given are listed with each of
15 What do you -- 2:52PM	15 the disclosures, so I don't recall them all off the 2:55PM
16 A Can you tell me where that paragraph is?	16 top of my head, but they are in the report.
17 Q I already did, but yes, it's Paragraph 34.	17 Q I would like to know each of the commonly
18 A Okay. As an example, a commonly used term	18 known uncertainties that your report relates to in
19 is when one refers to a well having penetrated sand or	19 the context of this case.
20 whether a well had penetrated oil. 2:52PM	20 A Okay. You would, for instance -- you would 2:55PM
21 So the common understanding is if you say	21 not disclose if your well had a problem. You would
22 a well penetrated sand, then it's common	22 not disclose if your well took a kick. You would not
23 understanding that it doesn't have oil in it.	23 disclose if your logging tool got stuck and required
24 Otherwise you would say it penetrated oil.	24 fishing. You would not -- I mean, so there are
25 Q So you're referring to commonly known 2:53PM	25 literally -- 2:56PM
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1 Q Dr. Detomo, just one second. I still	2:56PM	1 And so I'm responding to those. So I need	2:58PM
2 think you're not understanding the question.		2 to look at each of the plaintiff allegations in	
3 A I was giving you a list --		3 order to do that for you.	
4 MS. PHILLIPS: Rachel, please don't		4 Q Okay. I just wanted to make sure you	
5 interrupt Dr. Detomo. He's still answering your	2:56PM	5 appreciated the difference between the statement	2:58PM
6 question, if you could let him continue.		6 and --	
7 MS. JENSEN: He's actually not answering		7 A Now I understand it.	
8 my question.		8 So I'm looking at the alleged misstatement	
9 MS. PHILLIPS: Please let him continue.		9 after Shen 1 on 119. I'm just double checking each	
10 He's still answer your question, Rachel.	2:56PM	10 of them to make sure that we don't miss any.	2:59PM
11 MS. JENSEN: You can stop the speaking		11 Q Sure.	
12 objections.		12 A Well, for some reason I don't quote the	
13 Q Dr. Detomo, is that an allegation in this		13 actual words that go with it. I just talked about the	
14 case?		14 part of the complaint that said that.	
15 A I don't know. You asked for a list of	2:56PM	15 But for instance, in the complaint --	3:01PM
16 things that you would not disclose.		16 under part of the amended complaint there was a	
17 Q No, I did not, actually.		17 complaint that the Shenandoah well found	
18 What I asked was: When you say the		18 approximately 15 percent -- 50 percent more of the	
19 alleged omissions that plaintiffs identify are		19 same sand and confirmed down-dip thickening.	
20 either commonly known uncertainties, such as the	2:56PM	20 I believe part of the complaint was they	3:01PM
21 risk of faulting, I'm going to stop there, okay.		21 did not disclose they had omitted the fact that they	
22 So I don't know if you looked at the		22 had not found oil, so...	
23 complaint in this case. But are you saying that		23 Q Okay. Any other omission?	
24 this case is about whether a logging tool got stuck?		24 A Yeah. That was Shen 3.	
25 Is that what your understanding of this case is?	2:57PM	25 So after Shen 4, the complaint alleged	3:02PM
Page 114			
1 A No, I believe the last question you asked is	2:57PM	Page 116	
2 can you give me an exhaustive list of things you		1 that Shen 4 confirmed massive salt deposits that	3:02PM
3 wouldn't disclose and I was doing that.		2 would obstruct or prevent access to deposits. And	
4 Q Actually, I said in the context of this		3 so the complaint was is the fact that they had	
5 case. I'm actually talking about the context of	2:57PM	4 penetrated salt was omitted.	
6 your statement here.		5 Q Any other omission?	3:03PM
7 A Right.		6 A The reason that I said that you wouldn't	
8 Q So what I'm trying to ask you, Dr. Detomo,		7 normally disclose that is because every well	
9 which is I think quite clear, is what are the		8 penetrated salt.	
10 alleged omissions in this case that you are	2:57PM	9 Q Any other omission?	
11 referring to as commonly known uncertainties?		10 A I think part of the complaint after Shen 5	3:04PM
12 A Okay. Let's go through and find each of the		11 was although the -- they had -- the Shen 5 well	
13 alleged statements and we can go through them one at a		12 encountered more than 1,000 feet of net oil pay and	
14 time.		13 expanded the eastern extent of the field, there was a	
15 Q Okay. And just to be clear, Dr. Detomo, I	2:57PM	14 complaint that they had not disclosed that they had	
16 don't want to go off on another frolic and detour.		15 encounter tar in the well.	3:04PM
17 A Mm-hmm.		16 And they omitted that. So that was part	
18 Q I'm asking about you omissions, not		17 of the complaint.	
19 statements.		18 I think those are the three most	
20 A Right.	2:58PM	19 significant ones associated with those three wells.	
21 Q So do you have a list of omissions that		20 Q Are there any other omissions?	3:05PM
22 are alleged somewhere in your report?		21 A We already talked about the omission as to	
23 A Some of the -- some of the plaintiffs'		22 whether or not there were faults nearby.	
24 challenges are -- were around certain things being		23 And so I think there was a complaint	
25 omitted.	2:58PM	24 Shen 4 had not disclosed that they had penetrated a	
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1 especially since one doesn't know the a size or	3:05PM	1 whether companies have a duty to correct statements	3:07PM
2 orientation of the fault.		2 that later become inaccurate?	
3 Q Any others?		3 MS. PHILLIPS: Objection.	
4 A There may be others. I don't recall. Those		4 THE WITNESS: Is that a question for me?	
5 are the ones that I found quickly. For a more	3:05PM	5 BY MS. JENSEN:	3:07PM
6 exhaustive list, I would have to spend more time to do		6 Q Yes.	
7 more looking and research through.		7 A Could you repeat it?	
8 Q Okay. I mean that's my question. I want		8 Q Do you have an opinion about whether	
9 to know all the omissions that your report concerns.		9 companies need to correct statements that later	
10 So are those the omissions that your	3:05PM	10 become false or misleading?	3:07PM
11 report concerns?		11 MS. PHILLIPS: Objection.	
12 A I think those are the major ones my report		12 THE WITNESS: I don't know what the	
13 concerns.		13 requirements are for whether or not they need to do	
14 Q Are there any minor ones?		14 that.	
15 A Not that I recall off the top of my head and	3:05PM	15 BY MS. JENSEN:	3:08PM
16 not ones that would necessarily change, I think, my		16 Q Is there any -- do you have any opinion as	
17 opinion of that -- that these types of things are		17 to whether companies have any duty to update	
18 typically not disclosed and are well understood.		18 investors?	
19 Q So I just want to make sure. Have we		19 MS. PHILLIPS: Objection.	
20 covered all the omissions that fall in that category	3:06PM	20 THE WITNESS: My only opinion is what they	3:08PM
21 according to your report?		21 tell them should be truthful.	
22 MS. PHILLIPS: Objection, asked and		22 BY MS. JENSEN:	
23 answered.		23 Q Beyond that, you really have no idea what	
24 THE WITNESS: To the best of my memory.		24 the federal securities laws require; correct?	
25		25 A Correct.	3:08PM
	Page 118		Page 120
1 BY MS. JENSEN:	3:06PM	1 Q All right. Now, there is another category	3:08PM
2 Q Okay. So, Dr. Detomo, I'm entitled to		2 of omissions that you discuss in your report. And	
3 understand all of the bases for your report. So		3 that's that there's some detailed technical	
4 certainly if it was a basis for your report, you		4 disagreements that you would not expect to be	
5 would have told me that right now?	3:06PM	5 disclosed.	3:08PM
6 A To the best of my memory, yes.		6 Now, again, you don't know what is	
7 Q Okay. And if there was another omission		7 required to be disclosed; correct?	
8 that you were concerned with, it would appear in		8 A Correct.	
9 your report; correct?		9 Q And the term "technical" -- technical by	
10 A Yes.	3:06PM	10 that, it's often used as a term to downplay	3:08PM
11 Q Okay. So is it your opinion, then, that		11 something; right?	
12 if a risk is a commonly unknown uncertainty, then a		12 MS. PHILLIPS: Objection.	
13 company has no duty to disclose it under the federal		13 THE WITNESS: No, I don't understand that	
14 securities laws?		14 statement.	
15 MS. PHILLIPS: Objection.	3:07PM	15 BY MS. JENSEN:	3:08PM
16 THE WITNESS: I don't know what -- it's		16 Q Okay. So are you saying that the	
17 not my area of expertise to say what is underneath		17 whistleblower complaint to the SEC by the subsurface	
18 the federal securities law in terms of what's		18 lead on Anadarko was just a technical disagreement?	
19 disclosed and what's not.		19 A I don't have an opinion as to what the	
20 BY MS. JENSEN:	3:07PM	20 motivation of that disagreement was.	3:09PM
21 Q Right. So you don't have any idea one way		21 What I do know is that the disagreements	
22 or the other what's required to be disclosed		22 between different groups and different interpreters	
23 legally; right?		23 are actually encouraged because it makes sure that	
24 A True, correct.		24 one explores all ranges of possibilities.	
25 Q Ergo, you also have no opinion as to	3:07PM	25 Q So you just don't know the nature of the	3:09PM
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1 SEC whistleblower complaint; correct? 3:09PM	1 correct? 3:12PM
2 A I read it, but I don't have an opinion as to 3 whether or not -- how it turned out or what the 4 validity of it was.	2 A Yes.
5 Q And allegations of fraud, do you consider 3:09PM 6 allegations of fraud a technical disagreement?	3 Q And you say that Dr. Merrill's review of 4 public perception is not supported; is that right?
7 A If the allegations are allegations as to the 8 technical veracity of what was there, I would consider 9 it within my realm to comment on.	5 A I would have to see where it is, which 3:13PM 6 perception you're talking about.
10 But if it's a -- if it's an allegation 3:10PM 11 about other things, whether it's -- well, if it's 12 about non-technical items of which I consider myself 13 an expert, then I couldn't comment on them.	7 Q That's fair. Okay. Let's just -- let's 8 get a little more concrete.
14 Q You are aware that the teams at the time 15 used words such as "ethically questionable"; right? 3:10PM	9 A Okay.
16 A I've seen that written in places, but again, 17 I'm not here to judge the ethics or to evaluate the 18 ethics of what's done or any of that. Just the facts 19 that I had a chance to read through and understand.	10 Q Do you agree that financial analysts 3:13PM 11 covering a company are part of public perception?
20 Q So ethical disagreements are beyond the 3:11PM 21 purview of your report; correct?	12 A They are part of the public, yes.
22 A Yes.	13 Q Now, you are familiar with the term "giant 14 field"; right?
23 Q Elsewhere in your report you say that 24 nonconforming opinions needn't be disclosed; is that 25 right? 3:11PM	15 A I'm familiar with the term's usage, yes. 3:13PM
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1 A To my knowledge, you would not disclose -- 3:11PM 2 there's always nonconforming opinions, so yes.	16 Q It means over 500 MMBOE net recoverable?
3 Q So are you saying that only -- if only, 4 for example, hypothetical, only a minority of folks 5 at Enron thought they were committing fraud, then 3:11PM 6 that didn't need to be disclosed because it was a 7 nonconforming opinion?	17 A That's how some people have chosen to define 18 it, that's not an industry accepted value.
8 A No, I think if the facts are -- if you have 9 an opinion on the facts, then those facts should be 10 made -- you know, discussed within the company. 3:12PM	19 Q That's a generally understood term; right?
11 But it's very common for a company to take 12 a broad range of opinions and to say, okay, which 13 opinion are we going to -- technical opinion, when 14 there is a lot of uncertainty, which opinion is it 15 that we're going to go forward to? 3:12PM	20 A I wouldn't even say it was generally 3:14PM 21 understood. There are certain people who have 22 proposed that as a term.
16 I'm not an expert on fraud, but I would 17 expect fraud to not be -- it's either fraud or it's 18 not. There's not an opinion about it.	23 Q Certainly people in the industry use it 24 that way; right?
19 Q Okay. So, again, your report doesn't 20 touch on allegations of fraud or ethical 3:12PM 21 disagreements?	25 A Not always at 500, no. 3:14PM
22 A No, it does not.	Page 124
23 Q Now, in your report you criticize the 24 plaintiffs' experts for not opining whether 25 Anadarko's statements were misleading to investors; 3:12PM	
Page 123	
1 Q And what is the different amount that 3:14PM 2 you've heard?	1 A It's often not defined by a specific number.
3 Q So are you saying that only -- if only, 4 for example, hypothetical, only a minority of folks 5 at Enron thought they were committing fraud, then 3:11PM 6 that didn't need to be disclosed because it was a 7 nonconforming opinion?	4 And the other thing is that that number changes over 5 time because that number is always in reference to 3:14PM 6 what else is being found; right?
8 A No, I think if the facts are -- if you have 9 an opinion on the facts, then those facts should be 10 made -- you know, discussed within the company. 3:12PM	7 So 20 years ago, you know, 500 meant one 8 thing, today 500 means a different thing. So it's 9 just a kind of a mark in the sand that one keeps 10 moving around. 3:14PM
11 But it's very common for a company to take 12 a broad range of opinions and to say, okay, which 13 opinion are we going to -- technical opinion, when 14 there is a lot of uncertainty, which opinion is it 15 that we're going to go forward to? 3:12PM	11 Q Okay. That's your testimony, that it's 12 not 500 MMBOE?
16 I'm not an expert on fraud, but I would 17 expect fraud to not be -- it's either fraud or it's 18 not. There's not an opinion about it.	13 A My testimony is that it's not universally 14 accepted to be 500 MMBOE.
19 Q Okay. So, again, your report doesn't 20 touch on allegations of fraud or ethical 3:12PM 21 disagreements?	15 Q And it is sometimes used that way; right? 3:15PM
22 A No, it does not.	16 A It is sometimes used that way.
23 Q Now, in your report you criticize the 24 plaintiffs' experts for not opining whether 25 Anadarko's statements were misleading to investors; 3:12PM	17 Q Okay. Let me pull up an exhibit.
Page 125	
1 Q Okay. Let me pull up an exhibit.	18 MS. PHILLIPS: We've been going about an
2 A It is sometimes used that way.	19 hour and I think we were supposed to break around
3 Q Okay. Let me pull up an exhibit.	20 3:00, but whenever works for you. 3:15PM
4 A It is sometimes used that way.	21 MS. JENSEN: Okay. Give me a few minutes.
5 Q Okay. Let me pull up an exhibit.	22 I think we can do one quick exhibit and then we can
6 A It is sometimes used that way.	23 take a break.
7 Q Okay. Let me pull up an exhibit.	24 Q Dr. Detomo, you produced in this action an
8 A It is sometimes used that way.	25 Anadarko third quarter 2015 operations report that 3:15PM
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1 called Shenandoah a giant oil discovery; correct? 3:15PM
 2 A I may have. I don't recall exactly the
 3 document you're talking about. But I'm sure you'll
 4 share it with me, yes, or you can tell me what page if
 5 it's in my report. 3:16PM
 6 Q Sure. I'm actually going to show you
 7 something different. I think that's the -- I think
 8 the record speaks for itself there.
 9 MS. JENSEN: You should be able to see
 10 what's been marked as Exhibit 530. 3:16PM
 11 (Whereupon, Exhibit 530 was marked for
 12 identification.)
 13 MS. JENSEN: For the record, this is
 14 BOFAS_APPC-000259.
 15 THE WITNESS: Okay. I have it open. 3:16PM
 16 BY MS. JENSEN:
 17 Q Do you recognize this document?
 18 A No, I don't believe I've seen it before.
 19 Q Okay. Have you heard of Bank of America
 20 Merrill Lynch? 3:16PM
 21 A Yes.
 22 Q Reputable firm; right?
 23 A Yes.
 24 Q And did you see -- I know the type might
 25 be a little small, but this is -- I'll state for the 3:17PM

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1 record is appears to be a report from Bank of 3:17PM
 2 America Merrill Lynch dated March 19th, 2013 and
 3 the -- it's a company update buy and the headline is
 4 "Shenandoah: Major discovery confirmed valued at \$4
 5 a share." 3:17PM
 6 I'm going to direct your attention to the
 7 first paragraph here.
 8 A Okay.
 9 Q It begins by discussing a Shenandoah well.
 10 Do you see that? 3:17PM
 11 A Yes.
 12 Q You understand this to be Shenandoah 2?
 13 A Yes.
 14 Q And Bank of America is valuing Shen at \$4
 15 a share here? 3:17PM
 16 A That's what it says.
 17 Q Now, the report concerns the Shenandoah
 18 field; right?
 19 A I'm assuming that it means the Shenandoah
 20 field. It isn't specific, but since they are talking 3:18PM
 21 about a particular well, I would assume it to be that
 22 field.
 23 Q In other words, it's not the whole basin,
 24 it's this field?
 25 A Correct. 3:18PM

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1 Q And do you see here in this paragraph, 3:18PM
 2 this first paragraph under "Shenandoah: 5500MM to
 3 1 billion BOE potential," do you see that it says
 4 the management -- this is about midway through that
 5 paragraph. 3:18PM
 6 A Yes.
 7 Q The "management has taken the rare step of
 8 describing Shenandoah as a potential giant, meaning
 9 possibly more than 500 mm bbls."
 10 Do you see that? 3:18PM
 11 A Yes.
 12 Q Okay. Based on this document, it appears
 13 that Bank of America Merrill Lynch heard the word
 14 "giant" and perceived it meant over 500 million
 15 barrels; correct? 3:19PM
 16 A Yes, it says -- it hedges, it says describes
 17 Shenandoah as a potential giant, meaning possibly more
 18 than 500 million barrels. So it does hedge on it.
 19 But yes, they are saying it might be in
 20 that ballpark. 3:19PM
 21 Q Okay. And you're aware that in other
 22 Anadarko public statements, they didn't say just
 23 potential, they actually referred to Shenandoah as a
 24 giant oil discovery; correct?
 25 A No, I don't remember -- I don't remember the 3:19PM
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1 documents that I looked at them using the word 3:19PM
 2 "giant."
 3 Q I'll represent to you that you produced
 4 the document in which it did.
 5 A Okay. 3:19PM
 6 Q So if such a reputable organization as
 7 Bank of America Merrill Lynch agree Shenandoah is
 8 potentially a giant field, that would be reasonable
 9 to assume that at least some of the public perceived
 10 it that way? 3:19PM
 11 A Well, that -- yes, some of the public maybe
 12 perceived it that way, but it says potential and as
 13 long as a field is being appraised, it's just
 14 potential.
 15 Q Okay. And again, you don't have any 3:20PM
 16 reason to dispute that you produced the document
 17 from Anadarko that used the word "giant" without
 18 "potential" in front of it?
 19 A You haven't shown me such a document. I
 20 don't recall, but I don't dispute that I may have. 3:20PM
 21 MS. JENSEN: Let's go ahead and take a
 22 quick break.
 23 THE WITNESS: Time to come back?
 24 MS. JENSEN: Let's go off the record.
 25 THE VIDEOGRAPHER: Off the record, it's 3:20PM
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1 3:20 p.m.	3:20PM	1 A I have no idea what the requirements are. 4:02PM
2 (Recess taken.)		2 Q You don't know what the requirements are
3 THE VIDEOGRAPHER: Back on the record.		3 here and you don't know the requirements there;
4 It's 4:00 p.m.		4 right?
5 BY MS. JENSEN:	4:00PM	5 A Correct. 4:02PM
6 Q Welcome back, Dr. Detomo.		6 Q And with Beacon, same there, you haven't
7 A Thank you.		7 reviewed any of its internal documents; correct?
8 Q In your report you reference the company		8 A No.
9 called Navitas. Do you recall that?		9 Q As we're sitting here today, the field has
10 A Yes. 4:00PM		10 not yet been developed; is that correct? 4:02PM
11 Q And you agree that Navitas only got		11 A I was under the impression that it's being
12 involved with Shenandoah after the class period?		12 developed as we speak, so they may have actually
13 A Yes.		13 drilled some wells by now. They were going to
14 Q Navitas isn't the current operator or the		14 predrill the wells.
15 operator at this time; correct? 4:01PM		15 Q Let's put it this way, not one drop of oil 4:03PM
16 A That's correct.		16 has been sold from Shenandoah as of this time;
17 Q Beacon is?		17 correct?
18 A Beacon is the current operator.		18 A They are not producing yet.
19 Q So in preparing your report, you reviewed		19 Q And won't be for a year or longer;
20 Navitas's annual report? 4:01PM		20 correct? 4:03PM
21 A I reviewed I believe Navitas's annual report		21 A I believe it's 2024 is their projection.
22 and Beacon's.		22 Q And so it's not commercially successful at
23 Q And you also reviewed Navitas's		23 this time?
24 presentation to investors?		24 A Correct.
25 A Yes, I reviewed of number of their	4:01PM Page 130	25 Q Let's turn to Paragraph 66 of your report. 4:03PM Page 132
1 documents. I think so, but I would have for look at 4:01PM		1 A Okay. 4:03PM
2 the document to be sure.		2 Q You got there faster than me. Hold on one
3 Q You agree that these are public-facing		3 second.
4 documents; correct?		4 So in this paragraph you say you have not
5 A Yes. 4:01PM		5 seen any evidence that the appraisal team or 4:04PM
6 Q Generally designed to attract investments;		6 management at Anadarko concluded that the prospect
7 right?		7 was not commercially viable. Do you see that?
8 A Yes.		8 A Yes.
9 Q And you did not review any of the internal		9 Q Now, Dr. Detomo, you've heard the phrase
10 documents from Navitas showing its technical work; 4:01PM		10 "hear no evil, see no evil"; right? 4:04PM
11 right?		11 A Yes.
12 A I only reviewed the government and publicly		12 Q Now, did you read Mr. Pittinger's report
13 available documents.		13 in preparing your own?
14 Q So no internal documents from Navitas?		14 A Yes.
15 A No. 4:02PM		15 Q And in fact, Mr. Pittinger cited a number 4:04PM
16 Q And Navitas is not traded on the New York		16 of documents that indicated, among others, that the
17 Stock Exchange?		17 base case NAV for Shenandoah at the time was zero.
18 A No, not that I am not aware of.		18 Do you recall that?
19 Q Not a U.S. company; right?		19 A I recall that -- some calculations that
20 A I think it's mostly an investment group. 4:02PM		20 indicated that that's what he was saying, yes. 4:04PM
21 Q It's an Israeli company; right?		21 Q Well, I mean, that's what the internal
22 A Yes.		22 documents reflected; right?
23 Q You're aware that Israeli companies have		23 A Yes, but they were under certain
24 less strict disclosure requirements than U.S.		24 circumstances, along with a number of other
25 companies? 4:02PM	Page 131	25 calculations. 4:04PM Page 133

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1 Q But you don't deny that there was internal 4:04PM	1 Q Okay. So let's look to Page 20 or 4:09PM
2 documents that were reflected in Mr. Pittinger's	2 slide 20.
3 report that showed the base case NAV to be zero for	3 Okay. You've seen this chart before?
4 Shenandoah?	4 A Yes.
5 A At one time, yes. 4:05PM	5 Q And do you recognize this as being an MMRA 4:09PM
6 Q Let's turn to Paragraph 208.	6 analysis?
7 A Yes.	7 A Yes.
8 Q Okay. So you dispute Pittinger's report	8 Q And can you explain how the MMRA tool was
9 as to the PIR10 and you say, "There is no support	9 used to describe the resource distribution used --
10 for the contention that a project must reach a 4:06PM	10 there's the decision tree, actually, so let's go 4:09PM
11 certain 'threshold' to continue appraisal." Is that	11 down to the next one.
12 right?	12 How the MMRA tool was used to describe the
13 A That's correct.	13 resource distribution in the decision tree on
14 Q You discuss PIR in your report; correct?	14 slide 21?
15 A Yes. 4:06PM	15 A Yes. So the MMRA was used to define what 4:10PM
16 Q I think you defined it earlier, it	16 the success case would look like and the success case
17 measures profits and investment ratio?	17 here being defined as Shen -- you know, the two --
18 A Yes.	18 that the next wells would define success.
19 Q How do you calculate PIR?	19 The fail case which, is that the -- that
20 A You calculate PIR by calculating the profit 4:06PM	20 you would fail in the development of it, and then 4:10PM
21 of the field at the end of the field's life and after	21 the fail early case was that you would exit it
22 it's been abandoned and discount it at a certain	22 without developing.
23 factor and divide by the cost and expenditures of the	23 So they had these three cases. The MMRA
24 field under the same factor.	24 only defined the risk in the volumes -- or the risk
25 So you just divide the same two numbers 4:06PM	25 for -- and the volumes potentially for these cases. 4:11PM
Page 134	Page 136
1 and it gives you a ratio. The ratio is usually 4:06PM	1 The decision tree is a pretty standard kind of 4:11PM
2 greater than 1, but a lot of people quote it with 1	2 analysis one uses to try to decide under what
3 subtracted off, so .3 is .4. If you actually	3 circumstances one would -- what action would one
4 calculate the ratio, it would be 1.3 or 1.4.	4 take in the future.
5 Q So in Paragraph 79 of your report, you 4:07PM	5 Q Can you describe how the geologic 4:11PM
6 refer to PIR values and you say that what Pittinger	6 distribution is truncated above the commercial
7 quotes is for the mean or P50 cases; is that right?	7 minimum field size and above the economic minimum
8 A Yes.	8 field size?
9 Q So if you'll bear with me for a moment,	9 A Are you referring to a particular slide or
10 we'll mark an exhibit. 4:07PM	10 are you just asking a general question? 4:11PM
11 Dr. Detomo, you should be able to see what	11 Q Generally in the decision tree?
12 has been marked for identification Exhibit 531.	12 A Well, generally you truncate the volume
13 (Whereupon, Exhibit 531 was marked for	13 because if the volume is below a certain threshold, it
14 identification.)	14 does not really enter the distribution as to -- does
15 MS. JENSEN: This is a document that bears 4:08PM	15 not enter the distribution as being anything effective 4:12PM
16 the Bates stamp APC-000277887.	16 that you could do with.
17 THE WITNESS: Yes.	17 It usually falls in there. It usually
18 BY MS. JENSEN:	18 deals with the low side case -- in fact, it always
19 Q Do you recognize this document?	19 deals with the low side case.
20 A Just a second, I'm looking. 4:08PM	20 But in this case, again, you're back to 4:12PM
21 Yes.	21 the risk and the volumes and of the economics are
22 Q And you understand this to be a PowerPoint	22 separate from all this, right.
23 presentation on development full field economics for	23 So -- but anyway, so that's what it -- it
24 Shenandoah?	24 cuts off the lowest edge of it saying that that's
25 A Yes. 4:09PM	25 not even an effective volume that you would pursue. 4:12PM
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<p>1 Q What are the branches that are shown in 4:12PM 2 this tree and what's the basis for each of the 3 probabilities in this decision tree?</p> <p>4 A Well, so you follow the decision tree from 4:12PM 5 today and you say, if there's success -- there is a 6 37.4 percent chance of success. Okay?</p> <p>7 And then you would follow that over and if 4:13PM 8 you had success, then -- and this was based upon a 9 certain model, a certain set of assumptions. Like 10 one of the assumptions is that there was 100 million 11 barrel production spar.</p> <p>12 I believe this assumption also assumed wet 4:13PM 13 trees, in other words, trees located on the seafloor 14 which have different implications for cost and 15 whatnot. 4:13PM</p> <p>16 Given those things, if you had success, 4:13PM 17 then they looked at the P10, P50 and P90 volumes, 18 which you can see this is a symmetric distribution 19 because the way MMRA works, they are always 20 symmetric distributions. That's why P90 always has 21 the same percent chance as P10.</p> <p>22 But anyways, for each of those, then they 4:14PM 23 talked about what would be the expenditure and so -- 24 and the expenditure about what you would do in 25 Phase 2. Because if you had a success -- this is Page 138</p>	<p>1 presentation more in detail. 4:15PM 2 Q Is it your contention that Anadarko did 3 not calculate expected value based on running 4 economics on multiple scenarios?</p> <p>5 A They ran it on -- in this case on 100 MPOD 4:15PM 6 spar, which if you had the P10 full field, you would 7 not build 100 MPOD spar; right?</p> <p>8 So in that case, no. They've assumed one 9 development for the -- for all of the possible 10 cases. 4:16PM</p> <p>11 So I would say that this is not a 12 realistic expectation as to what the cost would be 13 for each of those possibilities.</p> <p>14 Q And have you done your own calculations as 15 to what would be reasonable? 4:16PM</p> <p>16 A No, I have not. But I would expect the 17 decision tree to look different.</p> <p>18 Q Okay. Because, I mean -- because you have 19 experience with Shell, right, and they did things 20 differently? 4:16PM</p> <p>21 A Well, but every company does decision trees, 22 so the decision tree is pretty standard.</p> <p>23 Q Okay. How does knowing a PIR10 help a 24 company make decisions?</p> <p>25 A Not every company uses PIR10, so -- but one 4:16PM Page 140</p>
<p>1 talking about a two-phase one. 4:14PM 2 Phase 1, you would go ahead and put some 3 development out there and then the chance of 4 Phase 2, P50 chance of Phase 2 and then P10 was 5 obviously if it's a huge field, then you would 4:14PM 6 probably drill extra wells and stuff. So that's why 7 the gross capex goes up.</p> <p>8 Q So does it show -- does this decision tree 9 show the costs for each of the five scenarios?</p> <p>10 A I believe it only shows the cost of the 4:14PM 11 wells here and it takes into account using a spar of a 12 certain size which has certain costs associated with 13 it.</p> <p>14 But again, this represents one model for a 15 potential development, so... 4:14PM</p> <p>16 Q And is it your contention that Anadarko 17 did not calculate an NPV10 for each of these five 18 branches or for each of the branches?</p> <p>19 A They did not calculate -- they calculated in 20 order to -- you know, I'm not sure if they actually 4:15PM 21 calculated NPV or not, so -- because if they 22 calculated NPV, then there would be a total estimated 23 NPV for the whole three legs together.</p> <p>24 So I don't recall seeing that, so I don't 25 know for sure. I would have to look through the 4:15PM Page 139</p>	<p>1 way to -- one factor that one takes into account is 4:16PM 2 to -- assuming a 10 percent inflation rate, would the 3 project make enough profit to compete in your general 4 portfolio and would it at least make enough profit to 5 exceed the cost of capital. 4:17PM</p> <p>6 So one usually assumes the cost of capital 7 is something like, you know, what you could make in 8 other investments, say 5 to 10 percent. So you 9 would not usually do anything lower than that, 10 although there have been exceptions. 4:17PM</p> <p>11 And then you would use a PIR10 at that 12 ratio in order to -- as one of the criteria in order 13 to decide which opportunities you're willing to put 14 your investments into.</p> <p>15 But I will say there's other things that 4:17PM 16 come in. Some investments take 20 years to recover 17 your investment, some investments take one year.</p> <p>18 So you typically balance a portfolio with 19 a range of things so that you are insulated against 20 things like market fluctuations. 4:18PM</p> <p>21 Q And when you're talking about companies, 22 again, you never worked at Anadarko; correct?</p> <p>23 A No, but I worked with a number of partners 24 all of which calculate PIRs.</p> <p>25 Q But you've never worked at Anadarko; 4:18PM Page 141</p>

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1 correct? 4:18PM	1 when people are talking about asset trades or asset 4:21PM
2 A Correct.	2 swaps.
3 Q Now, no doubt you saw internal documents 4 with a formula for projects needing to be equal to 5 or greater than .3 PIR? 4:18PM	3 Q Okay. So you're not familiar working -- 4 you're not versant in working with NAV as a -- as a 5 metric in the oil and gas industry? 4:21PM
6 A I saw documents that said that PIR.3 was a 7 threshold. But I also saw documentation specifically 8 from Chris Camden that said it was just one of the 9 criteria they would consider.	6 A No. Usually that -- that metric would 7 usually be calculated by financial people who were 8 trying to either swap or use the asset as leverage 9 somewhere else.
10 Q And the threshold was something that 4:18PM	10 So in exploration and development, it's 4:21PM
11 Darrell Hollek testified about; correct?	11 not a common metric that people would deal with.
12 A Darrell Hollek testified that it was -- 13 well, he testified to a number of things, but one of 14 the things he testified to was that they saw it as a 15 kinds of threshold, I believe he said. 4:19PM	12 And I've never actually calculated net asset value.
16 Q Now, who is more senior, Darrell Hollek or 17 Chris Camden?	13 Q So then you don't know whether when a 14 project is run at a certain oil price point that 15 yields zero, that means it has a zero NAV? 4:22PM
18 A Darrell Hollek is more senior, but I doubt 19 Darrell calculates PIRs.	16 A So you can run -- you do the same thing when 17 you calculate a PIR, you run it at a certain price 18 point.
20 Q Who would have been more likely to be part 4:19PM	19 So the price point -- in fact, most 20 companies -- I shouldn't say most companies. At 4:22PM
21 of the portfolio management discussions and 22 decisions?	21 least the companies I'm familiar with run it at a 22 series of price points. So they don't run it at one 23 price point because predicting the price of oil is 24 pretty darn near impossible.
23 A Probably at a very high level, the portfolio 24 is usually a global portfolio that you're managing.	25 So I'm sure it is calculated at a certain 4:22PM
25 So yes, I would say at the most senior level, they 4:19PM	Page 144
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1 discuss the portfolio. 4:19PM	1 price point, but I'm sure that that -- the reason 4:22PM
2 Q And Darrell Hollek was at the top senior 3 level; correct?	2 it's usually used in asset swaps and things like 3 that is because those are very short-term things and 4 the price of oil is well known.
4 A Yes, he was a senior.	5 Where when you're talking about 4:22PM
5 Q Okay. How is NAV defined in the oil and 6 gas industry? 4:20PM	6 developments, the price of oil ten or 15 years from 7 now is not very well known. So they use different 8 kind of numbers.
7 A Where are you talking about?	9 MS. JENSEN: Okay. I've now marked an
8 Q Oh, so yes. Step back. Switch topics.	10 exhibit which is Exhibit 532 a document that bears 4:23PM
9 A Okay.	11 Bates stamp APC-00784657. You should be able to see 12 this in your Exhibit Share.
10 Q How is NAV defined in the oil and gas 11 industry? 4:20PM	13 (Whereupon, Exhibit 532 was marked for 14 identification.)
12 A NAV, that abbreviation covers a number of 13 things. Could you put it in context for me?	15 THE WITNESS: Yes. Meeting of the board 4:23PM
14 Q Have you ever heard of the term "net asset 15 value"? 4:20PM	16 of directors.
16 A Yes, usually I use a slightly different 17 abbreviation for it instead of asset, but okay. Yeah,	17 BY MS. JENSEN:
18 net asset value. I usually see it as net opportunity 19 value, okay. Asset value.	18 Q Okay. Do you recognize this document?
20 Q Back to the question, how is it defined? 4:20PM	19 A Let me take a look. Some of the slides look
21 A Net asset value is usually an estimation of 22 familiar, but I'm not actually sure I've seen this 4:24PM	20 particular document.
22 what an asset is worth. But there are some 23 I've at least seen a couple of slides, but	21
23 complicated and interesting ways that that is 24 I don't know if I've seen this document or not.	22
24 calculated. So I'm used to seeing it. I'm used to --	23
25 the most common place I think I've seen it used is 4:21PM	24 Q Okay. Let's turn to --
Page 143	25 A I don't remember the midstream stuff in 4:24PM
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1 here. So that's why I don't think I've actually seen 4:24PM	1 A Yes. 4:29PM
2 this particular document.	2 Q The price deck here is \$60; right?
3 Q All right. In your report at	3 A Yes.
4 Footnote 822 --	4 Q That's the base case; right?
5 A 822 you said? 4:24PM	5 A That's the case calculations are going to be 4:29PM
6 Q Yes, this is at the end of Paragraph 912.	6 done in, yes.
7 A I see the reference.	7 Q So Anadarko ran its economics for
8 Q You see also that's the same document --	8 Shenandoah throughout the class period at 50 or \$60
9 or at least according to the Bates number, the same	9 a barrel; right?
10 document as what we've got up on the screen? 4:25PM	10 A I think there were other numbers at certain 4:29PM
11 A Right. I think that's the one I reference	11 times, but I'm not sure which ones were in the class
12 slide 6 through 9.	12 period and which ones were out, but okay.
13 Q Okay. You actually cite slides 91 and 92;	13 Q We're seeing -- or here this depicts
14 right?	14 bubbles. Do you see -- or circles, whatever you
15 A What was the footnote again? 4:25PM	15 want to call them? 4:29PM
16 Q Footnote 822.	16 A Yes.
17 A I'm in the wrong place. Sorry about that.	17 Q They are drawn relative to their asset
18 Graph or footnote 822?	18 size by net asset value in billions; correct?
19 Q Footnote 822.	19 A Yes.
20 A What page was it referenced on, do you 4:26PM	20 Q The Y-axis, there is a rate of return on 4:29PM
21 recall?	21 investment, the ROR?
22 Q Page 420.	22 A Yes.
23 A 420, that's where I'm going wrong.	23 Q And that's a capital efficiency measure;
24 Yes, slides 91 through 92 and 105, okay.	24 right?
25 Q So you reference this as saying that 4:27PM	25 A Yes. 4:30PM
Page 146	
1 Shenandoah is shown has providing long-term growth 4:27PM	1 Q On the X-axis, it's the remaining 4:30PM
2 and having value; right?	2 resource MMBOE?
3 A Let me get to the slide. It takes awhile to	3 A Yes.
4 refresh.	4 Q And again, the prospects on this graph are
5 Yes, I see where I say that in 4:27PM	5 depicted in circles. I want to draw your attention 4:30PM
6 Paragraph 912.	6 to Shenandoah, which is at the far left bottom of
7 Q Okay. I would like you to take a look at	7 the screen.
8 slide 90 in this document. So sorry, I'm talking	8 Do you see that?
9 about Exhibit 532.	9 A Yes.
10 A Where it says, "Major Asset Overviews"? 4:28PM	10 Q It is the smallest bubble on the graph; 4:30PM
11 Q Exactly. Okay. That's Page 90 on the PDF	11 right?
12 or 89 -- yes, sorry. I'm looking for the number on	12 A I'm trying to resolve because there's an
13 the slide itself, it's the lower right-hand side and	13 arrow -- it looks like an arrow aiming up.
14 also for identification you can look at the Bates	14 Q There's Paon; right?
15 number, which is APC-00784747. 4:28PM	15 A There's Paon, but then there is a line drawn 4:31PM
16 Do you see that page?	16 from Shenandoah up towards where Paon is. I can't
17 A No, because I don't get any APC numbers on	17 tell what that is.
18 the individual slides.	18 Q Right. It's like a speck; right?
19 Q You saw "Major Asset Overviews;" correct?	19 A No, because I -- well, I can't tell. All I
20 A Yes. 4:29PM	20 know is -- 4:31PM
21 Q So just scroll down one more.	21 Q You can't see it. Let's put it that way.
22 A Okay. "Opportunity Set"?	22 It's the only project on the graph that
23 Q Yes. "Opportunity Set: Materiality and	23 has a net value lower than .5 billion; right?
24 Investment Returns."	24 A Lower than .5 -- well, I don't know because
25 Do you see that? 4:29PM	25 I cannot see from this picture exactly what is 4:31PM
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<p>1 pointing to what. So it's either very small or 4:31PM 2 something is pointing somewhere else. So I agree. 3 Q It's almost invisible, it's so small. 4 Okay. So -- and according to this graph, 4:32PM 5 the remaining resource is less than 400 MMBOE; 4:32PM 6 right? 7 A Yes. That's clear. 8 Q That would be 113 net? 9 A That would be what 113? 10 Q Net. 4:32PM 11 A Where are you reading that? 12 Q To Anadarko. 13 So there's gross, right, and then there's 14 net? 15 A You're reading that off this slide? 4:32PM 16 Q I mean, you are aware of the different 17 partners at Shen; right? 18 A Yes. 19 Q So that's what I'm saying, it's net? 20 A You're saying -- okay. Yeah. I'm assuming 4:32PM 21 what they are plotting is net, yes. 22 Q Okay. Well, yes. And do you see here 23 there is two asterisks next to Shenandoah? 24 A Yes, that I see. 25 Q What does that mean? 4:33PM</p>	<p>1 A No, it doesn't appear to be the lowest on 4:34PM 2 either particular axis. Each axis has something 3 lower. 4 Q What is lower on the ROR? 5 A On the ROR axis? 4:34PM 6 Q Sorry, what is the -- it's the lowest with 7 both; right? 8 A The lowest on the ROR axis is GNB. 9 Q Sorry, withdrawn. 10 If -- in other words, Shenandoah had to 4:34PM 11 have a favored oil price of \$10 more than any other 12 asset on this slide deck to avoid showing a zero; 13 right, or a negative result? 14 A I don't know. I mean, all I know is what it 15 says, it says 70. I don't know where it would be if 4:35PM 16 you did it at a different value. I don't know why 17 they did that. 18 Q Right. So setting aside the axis, Shen is 19 the lowest NAV; correct? 20 A You're talking about the X-axis, the lowest 4:35PM 21 number? 22 Q Forget about the axis, the lowest NAV? 23 A You're basing that on the size of the dot? 24 Q You have no reason to disagree with that; 25 right? 4:35PM</p>
<p>Page 150</p> <p>1 A Well, according to the legend down at the 4:33PM 2 bottom, it says, "Shenandoah metrics shown at \$70 a 3 barrel." 4 Q Okay. So Shenandoah is shown at 70 and no 5 other project is; correct? 4:33PM 6 A Yes, probably because the -- yes. I won't 7 speculate as to why, but yes. 8 Q Why do you think that is? 9 A Well, I would have to speculate as to why 10 that is. There is a number of reasons one could do 4:33PM 11 that. 12 It could have something to do with the 13 quality of the oil. It could have something to do 14 with the expected price in the future. It could 15 have something to do with the profit margin in the 4:33PM 16 Gulf of Mexico. 17 So I don't know. 18 Q I mean, logically speaking, and you 19 probably know this from looking at documents, it 20 would have been a zero had it been run at 60? 4:34PM 21 A Yes, I don't know that. I don't know why 22 they did that. 23 Q Okay. Even at 70, the Shenandoah's NAV 24 was the lowest of all of Anadarko's prospects on 25 this graph; right? 4:34PM</p>	<p>Page 152</p> <p>1 A Yes, I don't -- I don't know where -- I 4:35PM 2 cannot either disagree or agree with it because I 3 don't know where you're getting that fact from. So 4 that could be true. I don't know. 5 I don't see that information from this 4:36PM 6 graph. 7 Q Okay. Maybe the next slide will help 8 clarify. 9 A Okay. 10 Q So recall again that the slide in the 4:36PM 11 bubble corresponds to the NAV; right? 12 A Yes. 13 Q Okay. So let's look at the next line 14 because I think you just couldn't see the speck that 15 was Shenandoah. 4:36PM 16 Do you see on this next slide, slide 91, 17 that Shenandoah is the smallest bubble? 18 A Sure, yes, I do between Colombia and 19 Mozambique, right, it's a little small bubble. 20 Q Yes, I mean, it's like a dot? 4:36PM 21 A Yes. 22 Q You see also that it's higher on the 23 increasing capital intensity side? 24 A Yes, I see that. Higher than what, but yes, 25 higher than some things. 4:37PM</p>

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1 Q Okay. 4:37PM	1 they were referring to. 4:40PM
2 A But I think the real description, if I	2 Q Why wouldn't it be in the same bullet?
3 remember this right, is there is a slide later down	3 A I don't know, but the 20,000 psi development
4 that talks specifically about Shenandoah's strengths	4 brings hurdles other than just the blowout preventer,
5 and weaknesses. 4:37PM	5 right? It brings a hurdle with a drilling rig, it 4:40PM
6 So then these numbers are actually -- it's	6 brings a hurdle with the equipment you have to use.
7 actually slide 105.	7 So it brings some engineering hurdles with
8 Q So let's turn to that.	8 it, which, like I said, aren't insurmountable but
9 A Okay.	9 typically add time and cost.
10 Q Let's look at this. 4:38PM	10 Q So it's your testimony that there were no 4:41PM
11 So the weaknesses here, do you see the	11 technological hurdles other than the 20K psi?
12 reference to "Current development economics	12 A There are no technical showstoppers.
13 challenged"?	13 Q But that's not what I asked you. My
14 A Yes, this is before Shen 5. So yes, after	14 question was --
15 Shen 4, that was true. 4:38PM	15 A There's always hurdles, the question is how 4:41PM
16 Q Okay. And after Shen 5, the MMBOE or the	16 high are they.
17 resource size reduced by almost 100 MMBOE; correct?	17 Q So I was asking a really simple question,
18 A The mean or the P50 did, the uncertainty	18 which is: Is it your testimony that there was no
19 reduced quite a bit, which is kind of what you want to	19 other technological hurdle other than the 20K psi?
20 account for. But yes. 4:39PM	20 A And the answer is no, there are always 4:41PM
21 Q Look, I'm asking you a very specific	21 hurdles.
22 question. You're trying to answer with a different	22 Q Okay. Including asphaltene mitigation?
23 answer. And I understand why you're doing that.	23 A I would not call that a hurdle, I would call
24 But let's just answer my question.	24 that just something you have to plan for.
25 Which is after Shen 5, the resource size 4:39PM	25 Q So it's your testimony that that was not a 4:41PM
Page 154	Page 156
1 reduced by almost 100 MMBOE; correct? 4:39PM	1 hurdle? 4:41PM
2 A The mean estimate of the resource side	2 A Not anything that was -- required any
3 reduced by 100 MMBOE approximately.	3 significant amount of concern.
4 Q Let's turn back to the weaknesses on this	4 Q Okay. So you had mentioned that this was
5 slide. 4:39PM	5 after Shen 4; right? 4:42PM
6 "Geologic uncertainty and the presence of	6 A Yes.
7 faulting affect development risks," you have no	7 Q Okay. Do you know when Shen 5 TD'ed?
8 reason to dispute that; right?	8 A Depending if we're talking about -- I
9 A No, that's true.	9 believe, though, it was at the -- in 2016, somewhere
10 Q The technological hurdles increase 4:39PM	10 around the end of 2016. 4:42PM
11 regulatory and operational risk, you agree with	11 Q So this board of directors slide is from
12 that?	12 August 1st and 2nd, 2016. So does that refresh your
13 A I agree with that. It could possibly affect	13 recollection that this was after Shen 5?
14 time to first production. There's probably very	14 A Well, I think what -- under "Opportunity" it
15 little risk in actually accomplishing it. The risk 4:39PM	15 says, "Incorporation of Shen 5 results will improve 4:42PM
16 was in the time.	16 the economics." So obviously the results of Shen 5
17 Q So there is a reference below to	17 are not included in here.
18 20,000 psi-rated drilling rig.	18 Q And again, Shen 5 actually ended up with a
19 Do you see that?	19 decrease in the resource size; correct?
20 A Yes. 4:40PM	20 A Shen 5 resulted in a decrease in the mean 4:43PM
21 Q So the technological hurdles that are	21 resource size.
22 being discussed in the bullet above that, fair to	22 Q Okay. At the bottom of the same slide,
23 say that that's something other than that particular	23 there is a "Key Play Statistics."
24 issue of 20K psi?	24 Do you see that?
25 A No, I believe that's the technical issue 4:40PM	25 A Yes. 4:44PM
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1 Q And it says the MMBOE is 113?	4:44PM	1 internally before the well actually TDs. Because 4:47PM
2 A Yes.		2 there's lots of stuff that gets done.
3 Q Okay. And it also says that NAV at \$70 is .01; right?		3 And so the fact that Shen 6 was a wet
4 .01; right?		4 well, I believe I would have to check, but there is
5 A Yes.	4:44PM	5 a good chance that because Shen 6 was wet and they 4:47PM
6 Q And again, this was a board of directors		6 knew that before TD, that they actually went ahead
7 presentation in July of 2016; correct?		7 with the write-down in May.
8 A Yes, the undeveloped resources, the -- is		8 Q So when did they find out that it was wet?
9 the remaining resource to be -- I believe the		9 A I would have to look at the records. I
10 remaining resource to be proved up because 113 is	4:44PM	10 don't -- let me see in the report. I have something 4:47PM
11 already less than what you just said they were		11 about timing, I think.
12 estimating it from MMRA.		12 So -- no, you may be right. I think what
13 So in other words, this is undeveloped		13 they decided on -- I think I'm wrong on that. I
14 resource, there's -- the current resource that they		14 think actually that wasn't the reason.
15 are considering already discovered and developed, so	4:45PM	15 I think the reason they wrote down is they 4:48PM
16 this is what's remaining. So it's not the total		16 realized that they were never going to use those
17 resource.		17 other wells, so they wrote down wells and volumes
18 Q Okay. So under the strengths it says,		18 that they knew could not exist and that they were
19 "Shen 5 results are similar to Shen 2." Right?		19 not going to use.
20 A Yes.	4:45PM	20 So they probably did that -- I am trying 4:48PM
21 Q So the results had already come in for		21 to remember the dates. I know they did that in May
22 Shen 5?		22 of 2017. Was it May 2017 or -- yes. 2016, but I
23 A Yes, the preliminary results had, yes. The		23 think Shen 6 drilled that later, 2017.
24 impact of them had not been fully calculated into		24 So I'm not exactly sure, thinking about it
25 everything yet.	4:45PM	25 out loud, but I'm sure it's because there were 4:48PM
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1 Q And what is the basis for your testimony?	4:45PM	1 certain -- there was enough knowledge then to know 4:48PM
2 A Well, I don't know why you would say under		2 that certain volumes being carried on the books were
3 opportunities, incorporation of the results will		3 not accurate. So they started writing some of it
4 improve the economics, okay.		4 down.
5 So obviously they haven't included them in	4:45PM	5 MS. JENSEN: I'm going to introduce 4:49PM
6 the economic calculation yet and even though that		6 another document.
7 volume -- that mean volume has gone down, the		7 All right. You should be able to see
8 overall result has -- they expect to improve it.		8 what's been marked as Exhibit 533.
9 Q Expect to. But you've not seen the workup		9 (Whereupon, Exhibit 533 was marked for
10 on that; right?	4:46PM	10 identification.) 1:33PM
11 A No, not on this slide.		11 THE WITNESS: Yes.
12 Q You have not -- you don't know the		12 MS. JENSEN: For the record, this is
13 document that had that workup; right?		13 APC-00264139. Let me say that again in case I
14 A They did calculations later on after Shen 5		14 missed a number. APC-00264139.
15 before drilling Shen 6. So there were some	4:46PM	15 Q Do you see it? 4:50PM
16 presentations as part of the justification for		16 A Yes, I do.
17 drilling Shen 6 that showed information about how		17 Q And have you seen this document before?
18 the -- how the results of Shen 5 were fully		18 A I'm just looking at it.
19 incorporated. But that was much after this. That was		19 Okay. I don't recall if I've seen this
20 right before Shen 6.	4:46PM	20 specific document before or not. 4:50PM
21 Q And the company decided to write down		21 Q Okay. Just reorienting to the last
22 Shenandoah before the results of Shen 6 were known;		22 document that we saw, you recall it was a board of
23 correct?		23 directors PowerPoint presentation for July of 2016?
24 A Before -- I'm not exactly sure because		24 A Yes.
25 Shen 6 -- lots of times there's results that are known	4:47PM	25 Q Okay. And does this appear to be around 4:50PM
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1 the same time frame? 4:51PM	1 there. Okay. 4:54PM
2 A According to the dates there, yes. This is 3 July 2016. 4:51PM	2 And when she says that otherwise it would 3 be showing zero, fair to infer from that you're 4 talking about the NAV? 4:54PM
5 here to BOD slides that are attached to this email 6 and this is an email from Gennifer Kelly to Ryan 7 Morgan on July 27th, 2016. 4:51PM	5 A Yes, I don't -- I couldn't interfere 6 directly exactly that. I mean, one might make that 7 inference. But to know for sure, I would have to look 8 at it a lot more closely and actually calculate to see 9 if that's the number that goes to zero. 4:54PM
8 And if you scroll down to the slides 9 below, does the slide about Shenandoah look 10 familiar? 4:51PM	10 Q Okay. In any event, she's saying without 11 inference that it would be showing zeros; right? 4:54PM
11 A Just a second. Let me make sure I can see 12 the whole slide. 4:52PM	12 A She said it would show -- some number in 13 here would show zero. 4:54PM
13 Yes, that looks very similar to the other 14 one. 4:52PM	14 MS. JENSEN: Okay. All right. We've been 15 going for about an hour. Let's just take a quick 16 break. 4:54PM
15 Q The other one that we saw that was a board 16 of directors slide show? 4:52PM	17 THE WITNESS: Okay. 4:54PM
17 A Yes. 4:52PM	18 THE VIDEOGRAPHER: We're off the record. 4:54PM
18 Q Now let's scroll back up to the email and 19 the email says, on the second paragraph there from 20 Gennifer Kelly to Ryan Morgan, "Shenandoah is 4:52PM	19 It's 4:54 p.m. 4:55PM
21 footnoted because the case was not selected in our 22 60-dollar base case. We used a 70-dollar run where 23 it was selected to get our numbers so that we 24 wouldn't be showing zeros." 4:52PM	20 (Recess taken.) 4:55PM
25 Do you see that? 4:52PM	21 THE VIDEOGRAPHER: Back on the record. 4:55PM
	22 It's 5:05 p.m. 4:55PM
	23 BY MS. JENSEN: 4:55PM
	24 Q Welcome back. 4:55PM
	25 Do you believe that fluid quality is an 5:05PM
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	Page 164
1 A Yes. 4:52PM	1 important consideration in oil production? 5:05PM
2 Q And you understand that that would mean 3 that Shenandoah would be showing zeros at a base 4 case run at the same price deck as other fields 5 which were still profitable? 4:52PM	2 A Yes. 5:06PM
6 A That's -- it claims that some numbers would 7 be showing zeros, it's not clear which ones, but yes. 4:53PM	3 Q And that it can ultimately impact the 4 development system design? 5:06PM
8 Q This was the numbers where they had the 9 NAV; right? 4:53PM	5 A Yes. 5:06PM
10 A No, it doesn't say that. It says "to get 11 our numbers," it doesn't say specifically which 12 numbers, but that could be. But I can't tell from 13 this note which numbers would be zero. 4:53PM	6 Q And the percent of oil that can be 7 economically recovered? 5:06PM
14 Q Sure. So if you look down at the 15 Shenandoah slide again. 4:53PM	8 A Yes. 5:06PM
16 A Yes. 4:53PM	9 Q And the price paid per barrel? 5:06PM
17 Q You see there is an NAV number, it's a 18 pretty low number, isn't it? 4:53PM	10 A Yes. 5:06PM
19 A Just a second. 4:53PM	11 Q What does it mean to commingle fluid in a 12 wellbore? 5:06PM
20 MS. PHILLIPS: Objection, vague. 4:53PM	13 A Every individual sand in a field, if the 14 sands are separated by some distance, even if it's 15 small, and if they have any difference in either their 16 pressures or their fluid details, then one can either 17 produce them each separately or one can open up a 18 wellbore to both of them at the same time. 5:06PM
21 THE WITNESS: I see NAV at \$70.00 of 0.01. 4:53PM	19 If you open it up to two different 20 reservoirs like that at the same time, you would 21 refer to that as commingling. 5:07PM
22 BY MS. JENSEN:	22 Q What is your understanding of why 23 engineers would want to commingle fluids? 5:07PM
23 Q Right. Fairly low number; right? 4:54PM	24 A Well, if you can commingle fluids, some of 25 the advantages are you -- if you didn't commingle 5:07PM
24 A 0.01 is 0.01. 4:54PM	Page 163
25 Q Almost zero if there was one less number 4:54PM	Page 165

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1 them, you would have to produce one and then produce 5:07PM
 2 the other. You could either do that in the same
 3 wellbore by doing a recompletion, you could do it in
 4 the same wellbore by putting in smart completions that
 5 allow you to switch back and forth between them or you 5:07PM
 6 could access them through another well.

7 So one of the advantages -- all of those
 8 things cost something. Whether I'm going to do one
 9 before the other and delay the production, whether
 10 I'm going to put a special completion -- smart 5:08PM
 11 completion equipment in the well or whether I'm
 12 going to drill a separate well, they all cost
 13 something. So one of the advantages of commingling
 14 is it saves you money.

15 Q Okay. And when is it not possible to 5:08PM
 16 commingle fluids?

17 A There are times -- it's always possible,
 18 there are just ramifications that might be
 19 unacceptable if you do.

20 So some of the ramifications are if the 5:08PM
 21 pressures are different by very much, then the
 22 higher pressure one will produce before the lower
 23 pressure one. Just because it's easier -- the fluid
 24 at a high pressure will flow to the wellbore first.

25 If the quality of the reservoir is 5:08PM

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1 zones. There are -- there is equipment, you can put 5:10PM
 2 that on a well now, it has been for a while where you
 3 can open one zone and then close it off and then open
 4 the other zone and then close it off. You can do that
 5 remotely. 5:10PM

6 So you can alternate between the zones.
 7 That would not commingle them.

8 You could also inject something down there
 9 to account for the differences in the fluid and
 10 that's pretty common to put a line down, inject some 5:10PM
 11 type of solvent. If one oil is heavier than the
 12 other, that will often help.

13 You can also do it by just producing one
 14 zone, the deeper -- typically the deeper zone first
 15 and then when that zone is pretty much produced, you 5:11PM
 16 just put cement in the bottom of the well and you
 17 punch some holes into the next zone. And then you
 18 produce those. Those are referred to as uphole
 19 recompletions.

20 Q Let me stop you there. 5:11PM

21 A Okay.

22 Q So you mentioned equipment and when did
 23 that equipment become available?

24 A That equipment is available today to do
 25 that. You put that in the well -- you design the well 5:11PM

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1 different so that fluids can flow in one easy -- 5:08PM
 2 more easily than the other, then one of the
 3 reservoirs will preferentially produce before the
 4 other and that usually means you have to do
 5 something. 5:09PM

6 The other times you would -- so you might
 7 not want to commingle in those case. You might not
 8 want to commingle if the fluids are very, very
 9 different.

10 So if one fluid is -- has different 5:09PM
 11 characteristics and qualities than the other, you
 12 might not want to mingle them. There are rare
 13 occasions where you actually would. But they are
 14 pretty rare.

15 So some of the kind of differences you 5:09PM
 16 might see in the fluid besides pressure that you
 17 would have to account for is obviously asphaltenes,
 18 waxes and if there's any difference in the gas ratio
 19 or in the quality of the oil. So those things would
 20 all -- you would have to account for them in some 5:10PM
 21 way if you were going to commingle.

22 Q Okay. I think you hit on this earlier,
 23 but when it's not possible to commingle, an
 24 alternative would be isolating zones?

25 A You could isolate -- you could isolate 5:10PM

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1 for that and you put that in the well at the time you 5:11PM
 2 what they call complete the well.

3 Q What is the equipment called?
 4 A It's called completion equipment. So it's
 5 typically tubing, valves, sliding sleeves, and it's 5:11PM
 6 got a bunch of components to it. But it's all just
 7 generally referred to as completion equipment.

8 Q When was that available, made available?
 9 A That is put in the well when you are getting

10 ready to, quote, complete it. Because there are other 5:12PM
 11 things you have to do. When you leave a well,
 12 typically you seal up so the fluids can't flow in.

13 So you have to go and you have to dissolve
 14 that out. You typically -- when you put the
 15 completion equipment in, you acidize the well in 5:12PM
 16 order to clean it.

17 Q Right. But the equipment that you're
 18 referring to, you said it's available now; right?

19 A Yes, today. I mean that's standard
 20 equipment. 5:12PM

21 Q Right. And when was that first available
 22 in the industry?

23 A Sliding sleeves and smart completions have
 24 been available, obviously using them in Brunei in
 25 2000 -- in 1999, 2000, so they've been available for a 5:12PM

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<p>1 long time. 5:12PM</p> <p>2 Q And you also mentioned chemical completion 5:12PM</p> <p>3 or chemical injection?</p> <p>4 A Yes.</p> <p>5 Q And is that xylene soaks? 5:12PM</p> <p>6 A There is a couple of different ones, they 5:12PM</p> <p>7 have different reasons you use them. So you -- for 5:12PM</p> <p>8 purposes of mingled reservoirs, xylene is probably the 5:12PM</p> <p>9 most common, but you put other kinds of chemicals down 5:12PM</p> <p>10 the well. 5:13PM</p> <p>11 You put acids down in order to clean up 5:13PM</p> <p>12 the pore space near the wellbore. You put xylene 5:13PM</p> <p>13 down, you put other kinds of solvents down in the 5:13PM</p> <p>14 well.</p> <p>15 So there's a whole range of those that 5:13PM</p> <p>16 would -- you have the option to choose from.</p> <p>17 Typically you will give an example of the well fluid 5:13PM</p> <p>18 to a professional engineering company who will tell 5:13PM</p> <p>19 you what the best fluid they have is to use in that 5:13PM</p> <p>20 circumstance. 5:13PM</p> <p>21 Q Now, an alternative would be drilling 5:14PM</p> <p>22 individual wells for each zone; right?</p> <p>23 A That's a possibility. If the zones are big 5:14PM</p> <p>24 enough that they could support the independent cost of 5:14PM</p> <p>25 a well, then that would be a choice you would 5:14PM</p>	<p>1 if the pressures aren't very different, then very 5:15PM</p> <p>2 soon the commingling is fine.</p> <p>3 Q Right. But if they are different 5:15PM</p> <p>4 pressures, then the commingling is not fine?</p> <p>5 A Right. But these reservoirs are at, you 5:15PM</p> <p>6 know, 15, 16, 17,000 psi and the difference between 5:15PM</p> <p>7 the different sands is only a few hundred.</p> <p>8 Q Slower rate of production impacts the NPV 5:15PM</p> <p>9 because you have to discount the value of the 5:15PM</p> <p>10 production number a longer period of time; correct? 5:15PM</p> <p>11 A Yes.</p> <p>12 Q And so if you're unable to commingle the 5:16PM</p> <p>13 fluids, it would negatively impact the NPV?</p> <p>14 A Depending on how you do it, to a small 5:16PM</p> <p>15 effect or to a large effect, yes, because it does not 5:16PM</p> <p>16 positively impact it, I can say that.</p> <p>17 Q Let's put it this way. So it does not 5:16PM</p> <p>18 positively impact the economics?</p> <p>19 A It may not actually -- commingling may 5:16PM</p> <p>20 improve the economics and so it just depends on what 5:16PM</p> <p>21 your alternatives are.</p> <p>22 Q Right. The inability to commingle?</p> <p>23 A Well, the --</p> <p>24 Q You kind of laughed. I mean, the 5:16PM</p> <p>25 inability to commingle would negatively impact the 5:16PM</p>
<p>Page 170</p> <p>1 consider. 5:14PM</p> <p>2 Q And either way, it would require multiple 5:14PM</p> <p>3 wells that would drive up the cost; right?</p> <p>4 A Well, if alls you do is put sliding sleeves 5:14PM</p> <p>5 in the same well, that doesn't require a substantial 5:14PM</p> <p>6 cost.</p> <p>7 But if you're going to drill a separate 5:14PM</p> <p>8 well, that would cost the cost of a well, yes.</p> <p>9 Q Do you agree that isolating zones for 5:14PM</p> <p>10 production in a multi-zone scenario would require 5:14PM</p> <p>11 intelligent completion to avoid commingling?</p> <p>12 A That's one approach. You could do a smart 5:14PM</p> <p>13 completion to avoid the commingling. That would be 5:14PM</p> <p>14 one approach.</p> <p>15 Q And so another problem with isolating 5:14PM</p> <p>16 zones would be that the production occurs at a 5:14PM</p> <p>17 slower rate than when the fluids are commingled; 5:14PM</p> <p>18 correct?</p> <p>19 A It depends on how different the zones are. 5:15PM</p> <p>20 Right. If the zones are not very different, then the 5:15PM</p> <p>21 answer is no. It produces fine.</p> <p>22 If the zones are very, very different, 5:15PM</p> <p>23 then yes, it could stretch things out.</p> <p>24 Remember, the higher pressure zone will 5:15PM</p> <p>25 lower down until whatever the other pressure is. So 5:15PM</p>	<p>Page 171</p> <p>1 economics? 5:16PM</p> <p>2 A The inability to commingle will raise your 5:16PM</p> <p>3 costs. The question is does it also raise your 5:16PM</p> <p>4 production and your income? So that's an economic 5:16PM</p> <p>5 calculation that has to be made. 5:16PM</p> <p>6 Q But all things being equal, if all other 5:17PM</p> <p>7 things held steady, then it would negatively impact 5:17PM</p> <p>8 the economics?</p> <p>9 A No, because if you're producing twice as 5:17PM</p> <p>10 much oil from two zones, okay, then the net present 5:17PM</p> <p>11 value of that could outweigh the actual cost of doing 5:17PM</p> <p>12 a smart completion. That's why you would do it.</p> <p>13 So it just depends on what you're costing 5:17PM</p> <p>14 versus what you're getting. So you have to do that 5:17PM</p> <p>15 calculation. 5:17PM</p> <p>16 Q So you have to do a calculation for a 5:17PM</p> <p>17 particular project. You cannot decide that in a 5:17PM</p> <p>18 vacuum?</p> <p>19 A Correct.</p> <p>20 Q Now, asphaltene instability can have major 5:17PM</p> <p>21 implications for field development; right?</p> <p>22 A If one does not account for them, it can 5:17PM</p> <p>23 have very major implications.</p> <p>24 Q So it could stretch from expenditure risk 5:17PM</p> <p>25 for one well to that of an entire field; right? 5:17PM</p>

<p>1 A Well, the worst thing -- well, you would 5:17PM 2 never allow a situation to occur where you would put 3 in jeopardy a field because of asphaltenes. There are 4 always inexpensive mitigation steps that you could 5 take to account for it. 5:18PM 6 Q So regardless of potential mitigation, it 7 does have impacts? 8 A It does have -- it impacts your plan, yes. 9 Q Right. So -- and also commingling oil 10 from different zones or reservoirs can exacerbate 5:18PM 11 the asphaltene deposition issues; right? 12 A Depending on what the asphaltene dropout 13 pressure is in one reservoir versus the other 14 reservoir, if you didn't account for it, you could 15 create a problem. 5:18PM 16 Q That's because commingling zones increase 17 asphaltene onset pressures; right? 18 A It can. It doesn't always and it's -- it 19 can change the dropout pressure, but the dropout 20 pressure -- estimating and measuring dropout pressures 5:19PM 21 is not an exact science, so it's always something that 22 you make sure you err on the safe side of. 23 So you don't try to run it very close to 24 exactly the dropout pressure. 25 Q Can you refer to asphaltene onset 5:19PM</p>	<p>1 continue to do it without taking action early on. 5:20PM 2 Q I would like to show you a document. 3 MS. JENSEN: You should be able to see 4 what's been marked as Exhibit 534. And the Bates 5 number for this document is APC-01760992. 5:22PM 6 (Whereupon, Exhibit 534 was marked for 7 identification.) 8 BY MS. JENSEN: 9 Q Let me know when you're able to see this 10 document. 5:22PM 11 A I can see it. 12 Q Oh, great. That was fast. Okay. 13 Do you recognize this document? 14 A I looked at a lot of documents, but this one 15 looks familiar. So I don't see anything in there that 5:23PM 16 makes me think I didn't see it. 17 Q Okay. So this is an article that you 18 produced in this case? 19 A Right. 20 MS. JENSEN: And for the record, this is a 5:23PM 21 document or article with a -- that's entitled 22 "Asphaltene Onset Pressure Uncertainty and Other 23 Asphaltene Issues and Field Development Planning." 24 Q You refer to this paper on asphaltene 25 mitigation? 5:23PM</p>
<p>Page 174</p> <p>1 pressures with an acronym? 5:19PM 2 A AOP. 3 Q So I'm going to refer to AOP for ease of 4 use there. 5 So AOPs cause precipitation and deposition 5:19PM 6 in tubing, impeding the oil flow; right? 7 A It could. But if you inject a solvent at 8 the face of the reservoir, then that will stabilize -- 9 or keep the asphaltene in solution and your risk of 10 deposition along the equipment is highly reduced. 5:19PM 11 It also depends upon the pressure drop 12 between the reservoir and the surface. So if that 13 pressure drop is big, you run a bigger risk. If 14 that pressure drop is small and it doesn't reach 15 asphaltene pressure, you have no risk. So it 5:20PM 16 depends. 17 Q So part of the risk is that asphaltenes 18 can plug tubing; right? 19 A It can, but no one ever allows that to 20 happen because you have pressure measurements in a 5:20PM 21 wellbore and if it starts to -- if the size of the 22 tubing or in the tubing -- if the size of the -- 23 effective size of the tubing starts to shrink, you'll 24 see that in your pressure measurement right away. 25 So you would never sit there and just 5:20PM</p>	<p>Page 176</p> <p>1 A Yes. 5:23PM 2 Q And did you consider this document in 3 forming your opinions? 4 A I considered this document as consistent 5 with my experiences with asphaltenes. 5:24PM 6 Q This was published in 2017; correct? 7 A Let me take a look. This was a paper 8 presented in 2017 at the Offshore Technology 9 Conference. 10 Q Do you know when in 2017 it was -- 5:24PM 11 A Yes, well, it says on there, May 1st through 12 4th. Before COVID, the Offshore Technology Conference 13 was always in Houston the first weekend in May. 14 Q This came out in May of 2017? 15 A Yes. 5:24PM 16 Q I would like to turn your attention to 17 Page 10. 18 A It's Page -- it's Page 10 is the one with 19 loss of PI due to asphaltene accumulation in the near 20 wellbore. 5:25PM 21 Q Right. What is PI? 22 A Production index. 23 Q Okay. This diagram is a productivity 24 index? 25 A Yes. 5:25PM</p>

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1 Q And this relates to the loss of 5:25PM	1 doesn't -- that's situation where that has nothing to 5:28PM
2 productivity due to asphaltene accumulation; right?	2 do with commingling. That's individual reservoirs and
3 A Under the -- yes, under the conditions they	3 the individual reservoir's asphaltene dropout
4 did there, which was the particular mitigation that	4 pressures at Shenandoah are pretty low, so that's not
5 they did where they did -- in this case they just did 5:25PM	5 going to happen for many, many years. And it may not 5:28PM
6 xylene washes every once in awhile to clean it up at	6 happen at all if you have reservoir pressure support
7 the reservoir face.	7 from the aquifer.
8 Q This is something that you mentioned	8 Q I asked a very simple question.
9 earlier; right?	9 MS. JENSEN: I'm going to move to strike
10 A Yes. 5:26PM	10 everything after "right." 5:28PM
11 Q That being the xylene soaks?	11 Q Okay. So this talks about a loss of
12 A Yes, this is one way of tackling it, but	12 productivity and complete shut down. You would
13 yes.	13 agree those are disastrous consequences; correct?
14 Q Okay. So in this chart it depicts that	14 A Yes.
15 the productivity index was increased only 5:26PM	15 Q You had talked about the level of 5:29PM
16 temporarily?	16 asphaltenes for Anadarko. Do you recall the level
17 A Well, if all you do is soak it to solve it,	17 of asphaltenes in Anadarko -- I'm sorry, for
18 you have not solved the problem, right. Then you take	18 Shenandoah?
19 the soak away and you're back to the same condition.	19 A Meaning the amount of asphaltene in solution
20 So yes. 5:26PM	20 in the -- 5:29PM
21 Q So -- but I'm just confirming that the --	21 Q The AOP?
22 what you referenced earlier, xylene washes -- or	22 A Oh, the asphaltene onset pressure. The
23 here it's called washes; right? Is that the same?	23 individual reservoirs I believe were fairly low. I
24 A No, not exactly because a xylene wash is a	24 don't recall the exact numbers, but I'm thinking
25 one-time thing. You push it in and you wash it down 5:26PM	25 somewhere between 5,000 and 9,000 psi. 5:29PM
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1 there. 5:26PM	1 The issue was is when they commingle them, 5:29PM
2 I'm talking about actually putting a	2 they got some numbers that were higher than that
3 continuous chemical injection system down in the	3 where the asphaltene dropout pressure for the
4 wellbore so it runs continuously. So that's I think	4 commingled fluid might be higher.
5 kind of one of the things they talk about when they 5:27PM	5 So that was part of the uncertainty in 5:29PM
6 show their little chart on Page 9.	6 question that if you did nothing, that that would be
7 Q Let's look at the paragraph before, which	7 of concern.
8 is now on Page 9 of the article.	8 Q In fact, the blended oils was 19,500 psig;
9 A Yes.	9 correct?
10 Q And you see that it says, "Mitigation and 5:27PM	10 A Without the numbers in front of me, I don't 5:30PM
11 remediation can be planned or not during the field	11 know for sure. But it may be something around that
12 development plan but they do not often address the	12 order, yes. I remember it was quite high.
13 root cause of asphaltene instability. Most	13 Q Extraordinarily high; correct?
14 importantly, what happens in the reservoir stays	14 A Well, when you commingle things,
15 usually in the reservoir, not allowing access to 5:27PM	15 extraordinary is a -- not a very definite word but it 5:30PM
16 evidence collection for postmortem analysis, causing	16 was high.
17 disastrous consequences such as loss of	17 Q And in fact, ConocoPhillips had never seen
18 productivity, total shut down, expensive and time	18 anything like it before; correct?
19 consuming xylene wash near production as shown"	19 A Well, that's true, but ConocoPhillips nor
20 below. 5:28PM	20 anyone else had drilled a 20,000 psi reservoir yet, so 5:30PM
21 Do you see that?	21 this is new area.
22 A Yes.	22 Q Would you agree that the paper that you
23 Q And again, this is a paper that you cited	23 referenced in your report talks about how there's
24 in your report; correct?	24 5 percent of wells in the GoM that have severe
25 A Right. But -- yes. So -- but that 5:28PM	25 issues related to asphaltenes? 5:31PM
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1 A I remember the paper said there were a 2 number of them in there. In fact, some of those 3 fields are fields that Anadarko operates and they have 4 successfully operated those fields with asphaltenes in 5 them, so they are experienced in it. 5:31PM	1 et cetera. So -- but yes, I think I looked at one -- 5:34PM 2 at least one of them.
6 Q So compared to the 5 percent that is 7 indicated in this article, how many of the 8 Shenandoah wells had problems with asphaltenes? 9 A I don't know the exact number. Remember, 10 you can only measure that if you have a -- if you have 5:31PM 11 a fluid sample, an oil fluid sample. And they did not 12 have fluid samples, obviously, at the wells that were 13 wet.	3 MS. JENSEN: All right. I've marked as 4 Exhibit 535 a native document produced in this 5 action and the Bates on it is APC-01183190. 5:36PM 6 (Whereupon, Exhibit 535 was marked for 7 identification.)
14 And so the key fluid sample that drove -- 15 fluid samples that drove these measurements were 5:32PM 16 from Shen 4 sidetrack 1 and Shen 5.	8 BY MS. JENSEN: 9 Q Do you see that? 10 A 535? 5:36PM 11 Q Yes.
17 So Shen 5 I believe had a slightly higher 18 level in some of the reservoirs of the solution of 19 asphaltenes.	12 A That's interesting, for some reason it came 13 across as coming at 10:25 a.m., I have no idea why 14 it's out of order with the rest of them. It's a 15 PowerPoint? 5:36PM
20 Q And which Shenandoah wells encountered 21 tar? 22 A Tar is a slightly different issue. I 23 believe the Shen 5 well encountered what's referred to 24 typically as a tar mat. And these also are not 25 uncommon in deepwater. 5:32PM	16 Q Yes, it's a PowerPoint. This appears to 17 be a PowerPoint dated April 5th, 2016. 18 A Yes, I have it up. 19 107 slides. 20 Q We won't go through all of them, I 5:37PM 21 promise. 22 A Let me look at the first few. 23 Yes. 24 Q You've seen this before? 25 A Yes. 5:37PM
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1 Q In fact, Shen 1, Shen 4 sidetrack 2, 5:32PM 2 Shen 5 and Shen 6 sidetrack 2 all encountered tar; 3 correct? 4 A They encountered different levels in 5 different places of tar mats, yes. 5:32PM 6 Q So the answer is yes; correct? 7 A Yes. They encountered different ones, yes. 8 Q So that's four out of six wells indicated 9 there was tar or asphaltene issues? 10 A Well, I don't know what you mean by 11 "issues." There are tar mats there which typically 12 are not extensive laterally. That's why you don't 13 find them consistently. And there is asphaltenes, 14 which one has to account for with mitigation 15 techniques. 5:33PM 16 Q So again, I believe the answer to my 17 question is yes; right? 18 A Okay. Yes, they encountered tar and yes, 19 they had fluids with asphaltenes. 20 Q Okay. Did you review any of the risk 21 registers at Shenandoah? 22 A I believe I looked at a risk register which 23 lists all the possible risk and then also talks about 24 what the -- usually it's broken up into what the 25 threats and the mitigations are and, you know,	1 Q Now, if you fast click to 49. Apologies, 5:37PM 2 it's actually slide 50. 3 A "Asphaltene Mitigation," yes. 4 Q And the next slide? 5 A After 50 or -- where it says "Testing 5:38PM 6 Results" or you want to go one past that? 7 Q That one I've got under slide 50. I don't 8 know if yours is different, but that's what I show 9 is slide 50. 10 A Okay. I'm looking at "Shenandoah Testing 5:38PM 11 Results." 12 Q And the asphaltene onset pressures, what 13 we've been calling AOP; right? 14 A Yes. 15 Q Range from 8,000 to 14,000 psi? 5:38PM 16 A Yes. 17 Q The commingling resulted in 16,000 to 18 20,000 plus psi? 19 A Yes. 20 Q Earlier you testified that you had worked 5:38PM 21 on a project with AOP of I believe 4,000 psi? 22 A Well, but the pressure in the reservoir was 23 only about 12,000 psi, so yes. 24 Q Right. But the AOP was 4,000 psi? 25 A Yes. 5:39PM
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1 Q You'll agree that 8,000 to 14,000 psi is 2 more severe or higher?	5:39PM	1 A Yes. 5:41PM
3 A Well, the important parameter is the 4 distance between the reservoir pressure and the onset 5 pressure. So in this case, if the reservoir pressure 5:39PM		2 Q And it says that most productivity gains 3 from mitigation are gone with in 30 days; right?
6 is 20, you've got 6 to 12,000 psi range. In the 7 case -- my case, it was 12 to 4, I had 8,000 psi 8 range.		4 A That's what it says.
9 Q Okay. And then with the commingling up to 10 20,000 K here? 5:39PM		5 Q Okay. And you have no reason to dispute 5:41PM 6 that that's what Anadarko thought internally at the 7 time; right?
11 A Yes, that makes it considerably worse.		8 A No, these are obviously soaks, right, 9 because you can see the timing of each soak. So
12 Q Right. Okay. In this slide it depicts 13 that the precipitation in the tubing was expected 14 from day one of production and that would be 15 10,000 feet below mud line. 5:39PM		10 that's not the only mitigation method. 5:42PM
16 Do you see that?		11 But yeah, if that's all you do is soaks, 12 this is probably what you would get.
17 A Yes. So what they did is they calculated 18 with no mitigation what would happen within the tubing 19 because as the fluid flows up the tubing, the pressure 20 drops and the temperature changes. 5:40PM		13 Q It doesn't say here that it's only soaks, 14 does it?
21 Q That means that according to the slide, 22 which doesn't comment on that one way or the other, 23 it means from the very beginning other they would be 24 dealing with precipitation; correct?		15 A Well, if it was continuous, it wouldn't go 5:42PM 16 up and down.
25 A With no mitigation, yes. 5:40PM	Page 186	17 Q But it doesn't say anything about soaks on 18 the slide, does it?
		19 A It does not say anything about it.
		20 Q All right. Let's turn to the next slide, 5:42PM
		21 "Mitigations Success and Path Forward."
		22 A Yes.
		23 Q This one says that the recent solvents are 24 much more effective but not restored for the long 25 term; right? 5:42PM
		Page 188
1 Q It doesn't say that on this slide, does 5:40PM		1 A I'm trying to see where you read the second 5:42PM 2 it? part from. I see, "Recent solvents are much more
3 A Well, they continued to develop the field 4 and if was the case with mitigation, then the field 5 wouldn't be developable. 5:40PM		3 effective" and then I see, "Field trial for continuous 4 inhibition planned for 2017."
6 Q Okay. We can just set that aside because 7 we know that Anadarko wrote this off.		5 Q And the productivity index on this diagram 5:43PM 6 is going down?
8 But in any event, below that it says, 9 "Asphaltene deposition at the rate of 10 2 barrels/20,000 barrels of oil flow." Right? 5:40PM		7 A Productivity index will always go down as 8 you produce a field, doesn't stay constant.
11 A That's what it says, yes.		9 Q It's depicting a downward arrow; correct?
12 Q Let's turn to the next slide.		10 A Yes, but I mean, it would do that even if 5:43PM 11 asphaltenes weren't there.
13 A Okay. Go ahead.		12 Q Okay.
14 Q Did you hear me?		13 A Productivity index always drops over time.
15 A Yes. I'm looking at mitigations now. 5:41PM		14 Q This is Anadarko's track record; right?
16 Q Okay. This is after the slide we were 17 just looking at; right? And the slide before was 18 depicting the severity of the problem; right?		15 A This is a combination of their experience 5:43PM 16 and what they plan to try to do, yes.
19 A It was predicting the potential severity of 20 the problem. 5:41PM		17 Q And they are referring to field trials?
21 Q Okay. And then now under the mitigation 22 experience, it says that it has nine years of field 23 experience; right?		18 A Yes.
24 A Yes.		19 Q They still didn't have any proven 20 strategies as of this time; correct? 5:44PM
25 Q Ten plus wells; right? 5:41PM	Page 187	21 A Putting up a continuous chemical injection 22 at the face of the reservoir is a proven technology, 23 they just had not done it --
		24 Q Okay.
		25 A -- here. 5:44PM
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<p>1 Q And this was the sum total of their 5:44PM 2 mitigation success as they put it?</p> <p>3 A I think there was a number of things in 5:44PM 4 their mitigation, one was investigating this, one was 5 doing soaks and another one was actually if in the 5:44PM 6 worst case actually having to intervene with coil 7 tubing.</p> <p>8 Q And they found that the chemical 5:44PM 9 injections were only 20 to 30 percent effective; 10 right?</p> <p>11 A The chemical injection soaks, yes.</p> <p>12 Q Okay. You can set that aside.</p> <p>13 MS. JENSEN: You should be able to see 5:45PM 14 what's been marked as Exhibit 536.</p> <p>15 And for the record, this is a document in 5:45PM 16 native that was produced in this case with a Bates 17 stamp APC-01677836.</p> <p>18 (Whereupon, Exhibit 536 was marked for 5:46PM 19 identification.)</p> <p>20 BY MS. JENSEN: 5:46PM</p> <p>21 Q Have you seen this document before?</p> <p>22 A I'll look. I'm not sure if I've seen this 5:47PM 23 exact presentation before. I may have seen it in a 24 different form. But I do recognize a number of the 25 slides.</p>	<p>1 impairment, well failure examples; right? 5:48PM 2 A Yes, there are examples of well failures.</p> <p>3 Q And one of those well failures is the K2 5:48PM 4 and that was on account of asphaltene; correct?</p> <p>5 A Yes, before they did mitigation. 5:48PM 6 Q This was an Anadarko well that you cited 7 as a success?</p> <p>8 A No, I cited the field as a success, not one 5:48PM 9 particular well. So they learned from that well and 10 then they made changes to the way they operated the 5:48PM 11 field.</p> <p>12 Q But this particle well, the K2 well failed 5:49PM 13 because of asphaltenes?</p> <p>14 A K2 is a field, there's one well in the K2 15 field. 5:49PM</p> <p>16 Q That failed --</p> <p>17 A K2 is not a well.</p> <p>18 Q -- because of asphaltene; right?</p> <p>19 A Yes.</p> <p>20 Q And then also Constitution was also a well 5:49PM 21 impairment or well failure example due to 22 asphaltene?</p> <p>23 A That's a -- Constitution in Ticonderoga are 24 fields. And in those fields there was a well 25 impairment, not necessarily a well failure but there 5:49PM Page 190 Page 192</p>
<p>1 Q Okay. For the record, this is a 5:47PM 2 PowerPoint presentation on "Shenandoah Field 3 Development Flow Assurance - Dry Tree."</p> <p>4 A Correct.</p> <p>5 Q What's the difference between dry tree and 5:47PM 6 wet tree?</p> <p>7 A A wet tree sits on the seafloor. And a dry 8 tree sits at the surface above the ocean.</p> <p>9 Q Please turn to slide 7.</p> <p>10 A "Why Ability to Enter the Well is 5:47PM 11 Necessary?"</p> <p>12 Q Okay. Do you see the second bullet there 13 says, "Mixing of zones, cross flow may result in 14 asphaltene destabilization, zone impairment 15 resulting in productivity decline. Potential to 5:47PM 16 lose recoverable reserves."</p> <p>17 And there is a number of historical well 18 impairment or failures below that.</p> <p>19 A Yes, of which only two of them refer to 20 asphaltene. One of them is wax paraffin, one is 5:48PM 21 corrosion and one is sand.</p> <p>22 Q Okay. So I'll --</p> <p>23 A Those are all well impairments.</p> <p>24 Q Right. I'm not asking you to categorize 25 them. These -- it says here these are well 5:48PM Page 191</p>	<p>1 was well impairment due to asphaltene, yes. 5:49PM 2 Q And, likewise, Ticonderoga was also a well 3 failure due to asphaltene; right? So there's not 4 actually just two, it's three?</p> <p>5 A I believe they are a joint producing field. 5:49PM 6 Q Okay. And are you saying that's just one 7 well then?</p> <p>8 A I don't know exactly which well it is. They 9 don't say which well here.</p> <p>10 Q Okay. 5:50PM</p> <p>11 A It would have been nice if they gave the 12 well name.</p> <p>13 Q In any event, they don't say it and for 14 purposes of this slide, at the time when they were 15 looking at this, there were historical well 5:50PM 16 impairment/well failure examples due to asphaltene; 17 correct?</p> <p>18 A Yes, there are well failures if you don't 19 take care of your well and you can see a bunch of 20 reasons there why that can occur. 5:50PM</p> <p>21 Q Let's walk through some of the asphaltene 22 mitigation strategies that you talk about in your 23 report.</p> <p>24 You talked about chemical injection, we 25 talked about that; right? 5:50PM Page 193</p>

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<p>1 A Yes, chemical injection -- I consider 5:50PM 2 chemical injection to be a continuous injection at the 3 well face.</p> <p>4 Q Coated tubing?</p> <p>5 A You can coat the tubing, you can buy special 5:51PM 6 tubing that has coating on the inside that prevents 7 asphaltene deposition from building up on it.</p> <p>8 Q And xylene soaks?</p> <p>9 A Xylene soaks were the examples that you 10 showed there earlier where if you start to have -- you 5:51PM 11 do nothing and if you start to have asphaltene 12 deposition, you go down and basically try to wash it 13 out with xylene.</p> <p>14 Q And production logging?</p> <p>15 A Production logging is when I put it as a 5:51PM 16 mitigation, you want to do production logging so that 17 you understand what's going on in your well.</p> <p>18 So that's -- when I say "mitigation," 19 information is power here. If you're having an 20 issue, you don't want to wait until it is so severe 5:51PM 21 that it's difficult to solve. So production logging 22 allows you to keep track of it.</p> <p>23 Q Use of completion equipment I believe you 24 said was --</p> <p>25 A Right. That's the sliding sleeves, the 5:52PM</p>	<p>1 MS. JENSEN: For the record, this is a 5:53PM 2 document that bears the Bates stamp APC-00011721.</p> <p>3 THE WITNESS: Okay.</p> <p>4 BY MS. JENSEN:</p> <p>5 Q Okay. If you'll take a look at -- you may 5:53PM 6 need to zoom in here. I know I need to.</p> <p>7 So do you see this is an email from Nikhil 8 Joshi to --</p> <p>9 A Yes.</p> <p>10 Q -- a number of people including Ms. Lea 5:54PM 11 Frye and others with the subject "Shenandoah flow 12 assurance report and impact on concept selection."</p> <p>13 A Yes.</p> <p>14 Q Okay. Now, if you'll turn to Page 10.</p> <p>15 A Okay. 5:55PM</p> <p>16 Q There is a discussion here in the context 17 of Shenandoah about asphaltene mitigation in 18 Section 3.3 of this memo.</p> <p>19 You see that?</p> <p>20 A Yes. 5:55PM</p> <p>21 Q Okay. And there's discussion about 22 asphaltene precipitation in the reservoir, 3.3.1.</p> <p>23 And then there is a conclusion there which is 24 underlined or underscored.</p> <p>25 And do you see that? 5:55PM</p>
<p>Page 194</p> <p>1 smart completions, all of that technology. 5:52PM</p> <p>2 Q And so those were the mitigation 3 strategies that you mentioned in your report; 4 correct?</p> <p>5 A Yes. 5:52PM</p> <p>6 Q Do you know who the flow assurance 7 engineer was at Anadarko?</p> <p>8 A I do not, actually. I probably saw their 9 name once upon a time, but it wasn't a name I recall.</p> <p>10 Q Did you look at internal documents about 5:52PM 11 what Anadarko knew at the time about mitigation 12 strategies and how it might apply to Shenandoah?</p> <p>13 A I looked at some of their internal 14 documentation, in particular I looked at some of their 15 spreadsheets that define what their mitigation would 5:53PM 16 be as a function of month and year just to understand 17 how they were calculating costs, et cetera.</p> <p>18 Q But you didn't look at all the internal 19 correspondence by the people who were responsible 20 for it at the time? 5:53PM</p> <p>21 A I doubt I looked at all of them.</p> <p>22 MS. JENSEN: I've now pulled up for you 23 what's been marked as Exhibit 537.</p> <p>24 (Whereupon, Exhibit 537 was marked for 25 identification.) 1:33PM</p>	<p>Page 195</p> <p>1 A Not yet, I'm looking. Down at the bottom 5:55PM 2 right before 3.3.2.</p> <p>3 Yes, I do see the part that's underlined.</p> <p>4 Q That part that's underlined says, 5 "Therefore, water injection to maintain pressure 5:55PM 6 cannot be considered as a reliable mitigation 7 measure for asphaltene precipitation and deposition 8 in the reservoir for concept selection." Correct?</p> <p>9 A That's what it says, yes.</p> <p>10 Q If you turn down to the next page, there 5:56PM 11 is a discussion on -- this is Page 11 of the PDF.</p> <p>12 And it talks about solvents such as xylene.</p> <p>13 Do you see that?</p> <p>14 A Are you talking about the underlined part 15 right before 3.3.3? 5:56PM</p> <p>16 Q Yes. But I'm talking about what is the 17 context here.</p> <p>18 And the context is the xylene soaks that 19 you were talking about; right?</p> <p>20 A Yes. 5:56PM</p> <p>21 Q He concludes, "Therefore, asphaltene 22 squeeze and/or solvent stimulations are not a 23 reliable method to mitigate asphaltene deposition 24 near wellbore."</p> <p>25 Do you see that? 5:56PM</p>

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<p>1 A Yes. 5:56PM</p> <p>2 Q There's also --</p> <p>3 A Right below it, it says, "asphaltene</p> <p>4 deposition in the wellbore may be mitigated with</p> <p>5 chemicals but testing is required," on the same page. 5:57PM</p> <p>6 Q It says, "may be mitigated with chemicals</p> <p>7 but significant testing is required." And it also</p> <p>8 says that chemical injections are only partly</p> <p>9 effective in preventing deposition; right?</p> <p>10 A Yes -- well, I believe that's true, but I'm 5:57PM</p> <p>11 not sure where it says that, so...</p> <p>12 Q Okay. You remember that.</p> <p>13 It says that "Improved effectiveness is</p> <p>14 being pursued by developing new chemistries but such</p> <p>15 a technology should be considered as new and 5:57PM</p> <p>16 unproven." Right?</p> <p>17 A Yes, but this document is from 2014.</p> <p>18 Q Understood. This is at the time when they</p> <p>19 were deciding -- when they were appraising</p> <p>20 Shenandoah; correct? 5:58PM</p> <p>21 A Yes, I believe this is right around the time</p> <p>22 of Shen 3.</p> <p>23 Q I'm going to show you another document.</p> <p>24 MS. JENSEN: Let's go off the record.</p> <p>25 (Recess taken.) 5:58PM</p>	<p>1 inhibition." Right? 6:05PM</p> <p>2 A At this time in 2015, that may be true. I</p> <p>3 don't -- I'll take your word for it, but I don't know</p> <p>4 for a fact.</p> <p>5 Q But that's what Anadarko thought at the 6:05PM</p> <p>6 time?</p> <p>7 A That's what it says.</p> <p>8 Q Okay. So that means that on the reverse</p> <p>9 side of the coin would be that 70 to 80 percent of</p> <p>10 asphaltene deposition would not be inhibited; 6:05PM</p> <p>11 correct?</p> <p>12 A No, I don't think you can draw that</p> <p>13 conclusion, but...</p> <p>14 Q I mean, if it offers only 20 to 30 percent</p> <p>15 inhibition, that means the remainder would be what 6:05PM</p> <p>16 it doesn't inhibit; correct?</p> <p>17 A I'm not sure I understand what a percent of</p> <p>18 non-inhibition is. So I don't -- I don't -- without</p> <p>19 spending some time and understanding exactly what</p> <p>20 you're saying, that doesn't necessarily -- I can't 6:06PM</p> <p>21 comment on that. I don't know.</p> <p>22 That doesn't sound exactly right to me.</p> <p>23 But it's not an either/or.</p> <p>24 Q Okay. Well, let's I guess agree to</p> <p>25 disagree on that one. 6:06PM</p>
<p style="text-align: right;">Page 198</p> <p>1 THE VIDEOGRAPHER: Back on the record. 6:03PM</p> <p>2 It's 6:03 p.m.</p> <p>3 MS. JENSEN: You should be able to see in</p> <p>4 your Exhibit Share a document that has been marked</p> <p>5 as Exhibit 538. 6:03PM</p> <p>6 (Whereupon, Exhibit 538 was marked for</p> <p>7 identification.)</p> <p>8 MS. JENSEN: And for the record, this is a</p> <p>9 document produced in its native format in this case</p> <p>10 and the Bates number is APC-00044530. 6:03PM</p> <p>11 THE WITNESS: Yes, I see it, "Asphaltene</p> <p>12 Mitigation April 2015."</p> <p>13 BY MS. JENSEN:</p> <p>14 Q Okay. Do you recognize this document?</p> <p>15 You have seen this document before; right? 6:04PM</p> <p>16 A Yes, in fact, it has a -- I believe a -- you</p> <p>17 can tell there is a bunch of slides copied and pasted</p> <p>18 from a bunch of previous presentations, but yes.</p> <p>19 Q If you turn to slide 8 now, just again to</p> <p>20 orient us in time, this is now in 2015 and the 6:04PM</p> <p>21 heading here is "Asphaltene State of the Art";</p> <p>22 right?</p> <p>23 A Yes.</p> <p>24 Q If you go to the second bullet here, it</p> <p>25 says the "Best chemical offers only 20 to 30 percent 6:05PM</p>	<p style="text-align: right;">Page 200</p> <p>1 A Okay. 6:06PM</p> <p>2 Q So the next heading, though, says, "Field</p> <p>3 plugging known to occur with best chemical." Right?</p> <p>4 A Yes, because they are talking about xylene</p> <p>5 washes. 6:06PM</p> <p>6 Q Okay. So plugging is still possible even</p> <p>7 with the best chemical at this time; right?</p> <p>8 A If -- yes, it's possible, if you wait too</p> <p>9 long.</p> <p>10 Q This is what the team is saying at the 6:06PM</p> <p>11 time; right?</p> <p>12 A Right. Right. But again, this is early in</p> <p>13 the project by the time they -- you can see a bunch of</p> <p>14 the slides in this that cut and pasted from previous</p> <p>15 slides. This is a pretty new thing that they are 6:07PM</p> <p>16 looking at in 2014 and '15. It isn't till later that</p> <p>17 they start kind of screwing down on exactly what their</p> <p>18 plan is.</p> <p>19 Q So the project started -- when did they</p> <p>20 discover Shenandoah? 6:07PM</p> <p>21 A Original discovery was in 2008 or '09.</p> <p>22 Q Now we're in 2015; right?</p> <p>23 A Yes, but there was a three-year delay due to</p> <p>24 Macondo, but yes.</p> <p>25 Q We'll just -- talk about the way time 6:07PM</p>

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1 passes; right?	6:07PM	1 Q And it goes into the frequency of each of 6:11PM
2 So this is now 2015, that's a number of		2 these intervention types?
3 years after 2009; right?		3 A Under the assumptions, it talks about -- let
4 A That's true.		4 me see. I don't see an intervention timeline or
5 Q More years between when it started and	6:07PM	5 frequency here. I see that if you decide to 6:11PM
6 when they write the thing off in 2017; right?		6 intervene, that it takes three to six months to
7 A There are more years -- there are years in		7 mobilize for a wet tree intervention, because it takes
8 between those things. Typical wells take anywhere		8 that long to get a drill rig there, and two to three
9 from, to drill, three to six months, yes.		9 months to mobilize a dry tree intervention because a
10 Q Now, when a tube is plugged, the	6:08PM	10 cable -- or a coiled tubing intervention on a platform 6:12PM
11 production has to stop for it to be cleaned out;		11 is a lot easier to get.
12 right?		12 But I don't see anything in here that says
13 A If it's completely plugged or even		13 how often you would need to intervene, what the
14 substantially plugged, then it has to be cleaned out		14 interval is or when it would even start. Because
15 usually by scraping.	6:08PM	15 obviously you wouldn't have to start until the 6:12PM
16 Q And requires production to be stopped in		16 pressure dropped quite a bit.
17 order to do so; correct?		17 Q Let's turn back to the slide before that,
18 A Yes, for a short time. It doesn't take long		18 slide 80.
19 to scrape the inside of a tube.		19 A Okay. There we go. Intervention or xylene
20 MS. JENSEN: You should be able to see	6:09PM	20 soaks with a frequency of once every one to two years. 6:12PM
21 what I've marked as Exhibit 539.		21 Q Let's look at the coiled tubing CT clean
22 (Whereupon, Exhibit 539 was marked for		22 out. Under there it says the "initial results
23 identification.)		23 indicate asphaltene deposition is a significant
24 MS. JENSEN: For the record, this is		24 concern."
25 APC-00349108.	6:09PM	25 Do you see that? 6:12PM
	Page 202	Page 204
1 THE WITNESS: "Workshop Day 1: Reservoir	6:09PM	1 A Yes. 6:12PM
2 Uncertainties, November 18, 2014."		2 Q And the xylene soaks will allow frequency
3 BY MS. JENSEN:		3 of one cleanout one to two years?
4 Q You've seen this document?		4 A Yes.
5 Do you see this document?	6:09PM	5 Q Now, under the xylene, that one assumes a 6:13PM
6 A I'm looking to make sure I remember looking		6 frequency of once every three to 12 months?
7 at this document. I'm not sure I remember every slide		7 A Once pressure drops between AOP, yes.
8 in it, but yes, I remember looking at it.		8 Q And then the acid stim/soak, that one
9 Q So if you turn to slide 81, fast click.		9 frequency is once every one to two years?
10 A How come you can't find anything interesting	6:10PM	10 A Yes, but that's for scale deposition. That 6:13PM
11 on slide 2 or 3?		11 doesn't have anything directly related to asphaltenes.
12 Q I don't know. But my finger is going to		12 That's for something called scale.
13 be tired after this.		13 Q Okay. And then the production logging,
14 So turning to slide 81, this refers to the		14 that one there needs to be a tubing cleanout and
15 different intervention types with respect to	6:10PM	15 that's once per year? 6:14PM
16 asphaltene mitigation; correct?		16 A Yeah, for the first two years.
17 A Is this the one that says, "Preliminary		17 Q Right.
18 Costs - Dry Tree versus Wet Tree"?		18 A That actually is coupled. And again, that's
19 Q Yes.		19 only in the case of commingling.
20 A Yes.	6:10PM	20 Q At the time they were thinking they may 6:14PM
21 Q Okay. And these are the interventions		21 need to do different zonal isolation completion
22 that Anadarko was looking at at the time; right?		22 scenarios; right?
23 A Yes, this is a version of that because the		23 A They were considering that. I don't know if
24 numbers tend to move around. But yes, this is		24 they ever landed on exactly how they would -- which
25 actually probably one of the more recent versions.	6:11PM	25 zones they might commingle and which not because they 6:14PM
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<p>1 kept changing them and discussing which ones to do in 6:14PM 2 which wells.</p> <p>3 Q Okay. Now, if you look at slide 81, it 4 discusses the preliminary costs. We started looking 5 at this before. 6:15PM</p> <p>6 A Yes.</p> <p>7 Q So there under the base case and the wet 8 tree, the costs are over 40 million for each 9 intervention?</p> <p>10 A Correct, that's because it's the cost of a 6:15PM 11 drill rig to float out there and to be above the tree 12 that's sitting on the seafloor. So you have to pay 13 for the rig.</p> <p>14 Q Right. And then -- so that's -- during 15 that time, during the intervention, there is no oil 6:15PM 16 production at that time; right?</p> <p>17 A Most of that intervention time is getting 18 things positioned. So during the intervention itself, 19 there is no production. But interventions only take 20 on the order of a few days. 6:15PM</p> <p>21 Q So I believe you mentioned earlier that 22 Anadarko never really could decide on a mitigation 23 strategy?</p> <p>24 A I think what they did is they had a 25 portfolio of mitigations that they were going to 6:16PM</p>	<p>1 mentioned earlier? 6:18PM 2 A Yes.</p> <p>3 Q Okay. And said that he was -- basically, 4 "In short," he says, so now I'm quoting, "the tubing 5 coating is not on the table for any of our wells 6:18PM 6 today."</p> <p>7 Is this an email that you had looked at 8 before you submitted your report?</p> <p>9 A No, I don't believe I saw this email.</p> <p>10 Q Okay. And you mentioned Typhoon in your 6:19PM 11 report as an example of successful asphaltene 12 mitigation; right?</p> <p>13 A Yes.</p> <p>14 Q Okay. Typhoon was a Chevron project?</p> <p>15 A Yes. 6:19PM</p> <p>16 Q They used coated tubing in that project?</p> <p>17 A They did, yes, they did use coated tubing in 18 the project.</p> <p>19 Q Okay. And he's saying -- Joshi is saying 20 that the tubing is still in the proof-of-concept 6:19PM 21 phase; right?</p> <p>22 A Well, that may have been his awareness and 23 his opinion. I happen to have been aware of coated 24 tubings being used for -- before that. So he's aware 25 of the one of Typhoon, but I was aware of others. 6:20PM</p>
<p>Page 206</p> <p>1 consider, but since they didn't get to a final 6:16PM 2 development plan, they didn't necessarily land on any 3 of them, or maybe all of them. So...</p> <p>4 Q Okay.</p> <p>5 A By the way, these are all interventions, 6:17PM 6 there isn't anything in there that's just like 7 continuous injection. These are all if everything 8 else fails and you have to intervene into the well, 9 these are the possibilities you could do.</p> <p>10 MS. JENSEN: So there is no question 6:17PM 11 pending, actually. Let me show you a document 12 that's been marked as Exhibit 540. And for the 13 record, this is APC-00052041.</p> <p>14 (Whereupon, Exhibit 540 was marked for 15 identification.) 6:17PM</p> <p>16 THE WITNESS: Okay.</p> <p>17 BY MS. JENSEN:</p> <p>18 Q Now we're in late 2015; right?</p> <p>19 A Yes. So 2015, this is probably about the 20 time -- this is pretty late. So this is Shen -- let 6:18PM 21 me check the date on Shen 6.</p> <p>22 This is after Shen 5, before Shen 6.</p> <p>23 Q Okay. So if you look at Nikhil's email of 24 October 21st, 2015, he says to Pat that they were 25 pursuing the coating of the tubing that you 6:18PM</p>	<p>Page 208</p> <p>1 Q Right. He was saying at this point 6:20PM 2 they're still trying to figure out if it's feasible; 3 right?</p> <p>4 A Right. So he's not sure who to contact or 5 how to -- according to the email I'm reading there, he 6:20PM 6 didn't know who to contact or how to pursue it.</p> <p>7 Q He's saying at this point "the tubing 8 coating is not on the table for any of our wells 9 today." Right?</p> <p>10 A That's what he says, yes. 6:20PM</p> <p>11 Q You are aware that by June of 2016, the 12 coated tubing was only listed as a backup mitigation 13 candidate?</p> <p>14 A I haven't seen where it was listed as a -- 15 with the specific title "backup." But I know it was 6:20PM 16 one that -- and you can see from there that was at 17 least potentially available and being considered.</p> <p>18 Q By September 2016, coated tubing was not 19 even in the running as a consideration for a 20 mitigation strategy; right? 6:21PM</p> <p>21 A That email indicated that he was not 22 considering it in the development strategy at that 23 point in time, yes.</p> <p>24 Q Right. And a year later, it was not even 25 a candidate at all for the mitigation; right? 6:21PM</p>

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<p>1 A At that time it was not a candidate. 6:21PM</p> <p>2 Q Okay. So at this point of late 2016,</p> <p>3 coated tubing was not a candidate. Chemicals only</p> <p>4 offered 20 to 30 percent innovation; right?</p> <p>5 A You're talking about xylene soaks, xylene 6:21PM</p> <p>6 soaks offered potentially somewhere around that</p> <p>7 according to their documentation.</p> <p>8 Q Okay. And according to their</p> <p>9 documentation, plugging could still occur with the</p> <p>10 best chemicals; right? 6:21PM</p> <p>11 A Under the right circumstances, with no</p> <p>12 pressure support and without the proper mitigation and</p> <p>13 intervention, then it would be possible that that</p> <p>14 could be a problem.</p> <p>15 Q An according to Anadarko's documents at 6:22PM</p> <p>16 that time, the technologies for mitigation were</p> <p>17 still new and unheard of then; right?</p> <p>18 A No, I don't think they were new and</p> <p>19 unproven. They were still exploring what all the</p> <p>20 possibilities were. Obviously they had already proven 6:22PM</p> <p>21 some of the mitigation strategies in other fields.</p> <p>22 Q So according to documents we saw, it was</p> <p>23 expressed that they were new and unproven; correct?</p> <p>24 A They felt some of them were unproven. But</p> <p>25 others they had already used in some of -- Anadarko 6:22PM</p>	<p>1 drop down. So you would have ample warning and you 6:24PM</p> <p>2 would never allow that to happen.</p> <p>3 MS. JENSEN: Okay. Let's take a break.</p> <p>4 THE WITNESS: How long?</p> <p>5 THE VIDEOGRAPHER: Off the record. It's 6:24PM</p> <p>6 6:24 p.m.</p> <p>7 (Recess taken.)</p> <p>8 THE VIDEOGRAPHER: We're back on the</p> <p>9 record. It's 6:41 p.m.</p> <p>10 BY MS. JENSEN: 6:41PM</p> <p>11 Q What tools are available to geophysicists</p> <p>12 to identify faults?</p> <p>13 A So faults can be -- for geophysicists, most</p> <p>14 faults that they identify are from their mapping of</p> <p>15 the seismic data where they look for discontinuities 6:42PM</p> <p>16 in the seismic as you move laterally.</p> <p>17 But geophysicists also use faults that are</p> <p>18 seen in wells and sometimes faults that are implied</p> <p>19 from -- faults that are implied from tops that are</p> <p>20 measured in wells. 6:42PM</p> <p>21 Q What is a coherence map?</p> <p>22 A Yes, a coherency map, also referred to as a</p> <p>23 dissemblance volume or -- basically you take a volume</p> <p>24 of seismic data, which is a sample, you know, every</p> <p>25 say 10, 15 feet by 100 feet by 100 feet. 6:43PM</p>
<p>Page 210</p> <p>1 had also used in some of their other fields. 6:22PM</p> <p>2 Q The interventions could cost also up to</p> <p>3 \$40 million as we saw; right?</p> <p>4 A If you were going to have to mobilize a</p> <p>5 drilling rig for a wet tree entry, it could cost 6:23PM</p> <p>6 upwards of 40 to \$45 million, yes, or in that range.</p> <p>7 Q And even with that cost, the production</p> <p>8 could still be stopped; right?</p> <p>9 A Well, the -- you would only bring out that</p> <p>10 drilling rig if you wanted to prevent the production 6:23PM</p> <p>11 from being stopped. You would not allow the</p> <p>12 production to be stopped and then bring the drilling</p> <p>13 rig out.</p> <p>14 Q Right. And we talked earlier about the</p> <p>15 production stopping? 6:23PM</p> <p>16 A Yes, well, if the production stopped because</p> <p>17 the tubing had plugged up, then you would have to</p> <p>18 intervene in some way to clean that.</p> <p>19 Q And the production would be stopped during</p> <p>20 that time? 6:23PM</p> <p>21 A Oh, you mean in terms of production?</p> <p>22 Q Yes.</p> <p>23 A Yes, but you would know way before then if</p> <p>24 you were starting to run into a problem because the</p> <p>25 pressure would drop and your flow rates would start to 6:24PM</p>	<p>Page 212</p> <p>1 You have this huge volume of data and you 6:43PM</p> <p>2 look at how similar the samples are laterally</p> <p>3 compared to each other.</p> <p>4 If they look very similar, in other words,</p> <p>5 you're looking at something where events are 6:43PM</p> <p>6 continuous, if it looks very similar, you get a very</p> <p>7 low value. So a high coherency.</p> <p>8 If they look very different because the</p> <p>9 event has been broken and there's something else</p> <p>10 juxtaposed against it, then the -- then the -- you 6:43PM</p> <p>11 would get a very low correlation.</p> <p>12 So you can generate an entire volume of</p> <p>13 these correlations or dissemblance. Then if you</p> <p>14 kind of draw a map or traverse or anything through</p> <p>15 that, you'll see where things look coherent and 6:44PM</p> <p>16 where they don't look coherent.</p> <p>17 That can sometimes be used to spot</p> <p>18 discontinuities in the data.</p> <p>19 Q And discontinuities also can be called</p> <p>20 faults; right? 6:44PM</p> <p>21 A Yes, discontinuities can be faults, they can</p> <p>22 be barriers, they can be seismic noise.</p> <p>23 Q Do anomalies -- I can't say that word.</p> <p>24 A Anomalies.</p> <p>25 Q Do anomalies on a coherency map indicate 6:44PM</p>

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1 faults? 6:44PM	1 see that discontinuity, as I said, map out as a 6:47PM
2 A They may or may not. Usually what you would 6:44PM	2 surface, so you would like to be able to extend it
3 do is you would look at how those anomalies, how those 6:44PM	3 vertically up and down.
4 incoherences map out. If the incoherence is a 6:44PM	4 So that's difficult to do with the data at
5 continuous set of discontinuities that can form a 6:44PM	5 Shenandoah. It's below salt, it's noisy, it has a 6:47PM
6 surface, then you would be more likely to interpret it 6:44PM	6 lot of artifacts from the imaging that comes through
7 as a fault. 6:44PM	7 the overlying salt.
8 Q OBMI wireline logs, they can also identify 6:45PM	8 But there are some places where you think
9 faults; correct? 6:45PM	9 you might be able to interpret a fault.
10 A So the OBMI is a tool that goes in a well 6:45PM	10 And so -- but there are also many places 6:48PM
11 that looks basically at the layering of the sediment 6:45PM	11 where faults were interpreted that were later proved
12 in a 3D sense around the wellbore. So if there is a 6:45PM	12 to not exist. So you can be fooled.
13 discontinuity in that layering in a wellbore, then 6:45PM	13 But yes, there are a couple of places
14 that will give you an idea of what that discontinuity 6:45PM	14 where you could say, hey, I feel a little more
15 is. 6:45PM	15 confidence that there may be a fault there. 6:48PM
16 But then you have to make an 6:45PM	16 Q Now, if a fault is identified in a
17 interpretation whether that discontinuity is a fault 6:45PM	17 borehole such as Shen 3 BP1 through logs or samples,
18 or is that discontinuity due to something else. 6:45PM	18 that's also evidence of faulting; correct?
19 Q You mentioned offset in your report. You 6:45PM	19 A Usually you would only map it as a fault if
20 know the concept of offset; correct? 6:45PM	20 you could tie it to an offset imaged in the seismic, 6:48PM
21 A Yes. 6:45PM	21 right.
22 Q So what magnitude of offset would be 6:46PM	22 So would you want confirmation between the
23 required to competently map a fault in the seismic 6:46PM	23 two sets of data because the well does not tell you
24 data? 6:46PM	24 how much offset is on a fault, it just tells you
25 A So in order to confidently map a fault from 6:46PM	25 there is a discontinuity. 6:48PM
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1 the seismic data, you have to see that seismic data 6:46PM	1 So if you go through a fault or if you see 6:48PM
2 make a -- again, we talked about correlation, you 6:46PM	2 a discontinuity, it could be a very small
3 would have to have a discontinuity in the seismic data 6:46PM	3 discontinuity or it could be a larger one. It's
4 as you move from one place laterally to the next. 6:46PM	4 very difficult to tell.
5 The seismic data is limited to a certain 6:46PM	5 Usually you like to correlate it with 6:49PM
6 frequency content. And the frequency content gets 6:46PM	6 something that you see on the seismic that gives you
7 lower and lower the deeper you go and if you go 6:46PM	7 more reason to believe it's real and that it's
8 below salt. 6:46PM	8 substantial.
9 And so the frequency content is inversely 6:46PM	9 Q If one fault is identified in a borehole
10 proportional to what you can resolve. So the lower 6:46PM	10 such as it was in Shen 1 bypass 1, you wouldn't 6:49PM
11 the frequencies, then you need a higher 6:46PM	11 expect that to be the only fault in the area in a
12 discontinuity in order to see it. 6:46PM	12 field as large as Shenandoah, would you?
13 So at Shenandoah, based upon the seismic 6:46PM	13 A So the faults are a result of what is going
14 data that I saw in the images, I estimated it would 6:46PM	14 on with the basin.
15 be very difficult to map any discontinuities which 6:46PM	15 And so you would expect if there's any 6:49PM
16 were smaller than, say, about 300 feet. 6:46PM	16 faulting for it to be different in different places
17 Q So your testimony is that the magnitude of 6:46PM	17 of the basin.
18 offset required to confidently map a fault is about 6:46PM	18 So, for instance, up very close to the
19 300 feet? 6:46PM	19 salt where things are moving and there's -- the
20 A To confidently map it. You might extend 6:47PM	20 sands are thinner and the salt is moving, you would 6:49PM
21 that down to 200 feet but with a lot less confidence. 6:47PM	21 expect it to be a little more distorted and
22 Q Okay. In the final interpretation do 6:47PM	22 potentially faulted than you would in the middle of
23 faults exceed that resolution? 6:47PM	23 the basin which wouldn't have that.
24 A Well, one of the other difficulties with 6:47PM	24 So if I see one fault, would I expect
25 interpreting faults down there is you would like to 6:47PM	25 another, not necessarily. Faults are difficult to 6:50PM
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1 predict, so -- without actually seeing them and 2 mapping them. 3 But you certainly would not say if you saw 4 one, you would at least consider the possibility 5 that there may be others even if you could not map 6 them. 7 Q Do you agree that the north/south 8 lineations in the Shenandoah coherency maps are 9 faults? 10 A I think some of them are likely to be 11 faults. 12 Q And are they normal or reverse faults? 13 A Well, that's an interesting question. So a 14 normal fault is one in which you have extension and so 15 things slide apart. Reverse faults are when you have 16 compression and they push one over the top of the 17 other. 18 And most of the faults you would expect in 19 Shenandoah basin to be normal faults. 20 But there are -- again, because the 21 seismic data is so difficult, it's hard to tell for 22 sure. 23 There is the possibility that this basin 24 may have a reverse fault in it. But there is no 25 clear evidence indicating for sure that that's the	6:50PM	1 So some of these faults, they may not 2 extend down into the deeper part of the basin, they 3 may not extend very far to the south. 4 In fact, most of them were interpreted as 5 when you got to an area where you could see a little 6 bit better in the seismic, which was away from the 7 northern edge, even then the faults were not drawn 8 all the way across the basin. 9 So no, not necessarily the faults don't 10 have to extend very far.	6:53PM
		11 Q Well, would you expect for the faults to 12 continue to the north into Shenandoah field proper? 13 A You don't know. The reason I say that is 14 because you have to extrapolate to the north and as 15 you move out of the center of the basin and you go 16 towards its edges, the amount of simple normal 17 faulting and the shape of it obviously north to south 18 could change. 19 So if there is faulting there, 20 understanding where it becomes even more 21 difficult.	6:53PM
		22 Q Let me ask you this: If -- the stress 23 field affects the basin? 24 A Yes. 25 Q Well, then explain why the eastern field	6:54PM
	Page 218	Page 220	6:54PM
1 case. 2 Q So if it's -- assuming it's a normal 3 fault, what would that tell you about the 4 deformation history of the Shenandoah basin? 5 A Well, the Shenandoah basin is formed by -- 6 all the sediments in Shenandoah basin were laid down 7 flat or pretty close to flat on the seafloor. 8 So as -- so the center -- the weight of 9 the sediment at the center of that deposition 10 started weighing the salt down that was underneath 11 it and pushing the salt -- pushing it out of the way 12 and causing it to flow laterally. 13 So the center of the basin sank and 14 additional sediments filled it up. 15 So if I see normal faults, what it tells 16 me is that the space -- the rate at which the salt 17 is being pushed out is exceeding the rate at which 18 the sediments can fill it in. So then the sediments 19 start to slide into the center. 20 Q So would the stress creating the faults 21 south of the Shenandoah field likely include the 22 entire basin even under the field? 23 A Not necessarily because it depends on when 24 the salt moved compared to when the sediment filled 25 in.	6:51PM	1 area updip of Shen 3 would not have the same 2 structural complexity as the western half of the 3 field. 4 A The western half of the field has a salt 5 root, a salt face moving up against the sediments. 6 The area where updip of Shen 3 are 7 sediments that have just been laid over the top of 8 that are truncated. So they are different stress 9 areas. So I would expect them to be different. 10 Now, what would the faulting look like in 11 those areas and how much of it is there, as you get 12 close to the salt base, I would expect more because 13 that's because the stress will be higher. 14 But without having evidence, it would be 15 real tough to put any of that on a map.	6:54PM
	Page 219	Page 221	6:54PM
		16 Q So in your report you talk about high 17 confidence faults; right? 18 A Yes. 19 Q How do you as a geoscientist identify 20 them? 21 A Well, I looked at -- if I interpret an event 22 and I see a discontinuity, I look to see if I can find 23 evidence of that discontinuity below it, above it, and 24 does that discontinuity extend, you know, laterally. 25 If I can make sense of it so that I have a	6:55PM

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1 lateral surface that looks geologically reasonable, 6:56PM	1 A Yes. 6:58PM
2 then I have a little more confidence in a fault like 6:56PM	2 Q What was Doug Shotts's method for adding 6:58PM
3 that. 6:56PM	3 faults to his simulation?
4 If I can only map a very short piece, you 6:56PM	4 A Doug Shotts did a number of simulations. He 6:58PM
5 know, one event has some offset on it but the one 6:56PM	5 did an experimental model simulation that just 6:58PM
6 below it and the one above it doesn't, or I can't 6:56PM	6 arbitrarily put in many fault, less faults, 6:58PM
7 map it very far, then I just have less confidence 6:56PM	7 north/south faults, east/west faults, so -- and he 6:58PM
8 that I am mapping a fault and consider the 6:56PM	8 explored from a model perspective like what would the 6:58PM
9 possibility I'm just mapping noise. 6:56PM	9 impact of severe faulting be compared to less 6:58PM
10 Q If you extrapolate from the high 6:56PM	10 faulting. 6:59PM
11 confidence faults in the basin, you can hypothesize 6:56PM	11 So it wasn't based necessarily on data, it 6:59PM
12 as to the frequency of significant faults in the 6:56PM	12 was just a model exercise.
13 areas of poor seismic; right? 6:56PM	13 Q It was a commonly used modeling exercise; 6:59PM
14 A You could try to hypothesize it, but then 6:56PM	14 right?
15 it's just a hypothetical fault. 6:56PM	15 A I wouldn't say commonly used. It's one way 6:59PM
16 Q It would be maybe less high confidence, 6:56PM	16 to just explore as you -- as you get more information 6:59PM
17 but it would still be a methodology for identifying 6:56PM	17 about a field, you get an idea of where do I sit 6:59PM
18 potential faulting? 6:56PM	18 within the range of possibilities; right. Do I sit 6:59PM
19 A Yes, usually faulting you cannot map or you 6:57PM	19 with lots and lots of faults or do I sit with a few 6:59PM
20 cannot really identify, but you recognize there's some 6:57PM	20 faults? So it gives you some idea of what kind of 6:59PM
21 possibility of it. 6:57PM	21 recovery factor to start using.
22 You usually try to deal with it in other 6:57PM	22 Q You're aware that in Doug Shotts's 6:59PM
23 ways. You either try to deal with it in terms of 6:57PM	23 simulation, there was a downside recovery factor 6:59PM
24 things like recovery factors and other ways rather 6:57PM	24 with east/west faulting of 5 percent; right?
25 than putting them on a map. Because the last thing 6:57PM	25 A Well, it was more than just east/west, it 7:00PM
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1 you want to do is put a fault on a map which will 6:57PM	1 was east/west and north/south faulting. East/west 7:00PM
2 drive where you put wells and then find out it 6:57PM	2 faulting would automatically imply that you had no 7:00PM
3 doesn't exist. 6:57PM	3 aquifer support whatsoever because the aquifer has to 7:00PM
4 Q What information is necessary to add 6:57PM	4 move from -- the water has to move from the south to 7:00PM
5 faults in the simulation stage? 6:57PM	5 the north. 7:00PM
6 A When you're doing reservoir simulation? 6:58PM	6 So it automatically assumed no aquifer 7:00PM
7 Q Yes. 6:58PM	7 support and it had compartments, I believe, that 7:00PM
8 A Usually when people do reservoir 6:58PM	8 were on either a 1-mile by 2-mile rectangle, the 7:00PM
9 simulations, if there is a clear fault, they will 6:58PM	9 whole field into independent rectangles and then 7:00PM
10 build it into the reservoir model. 6:58PM	10 what would a recovery be. 7:00PM
11 If there's not a clear fault, most 6:58PM	11 Q Are you aware of any of Anadarko's 7:00PM
12 reservoir engineers I've worked with will experiment 6:58PM	12 resource assessments including that -- Shotts's 7:00PM
13 with putting in barriers and taking barriers out and 6:58PM	13 5 percent recovery factor?
14 looking at what the impact of such artificial 6:58PM	14 A Can you repeat the question?
15 barriers are. 6:58PM	15 Q Yes, I may have asked it poorly. Let me 7:00PM
16 And that's pretty common. In fact, even 6:58PM	16 try again.
17 after the field starts producing, if the reservoir 6:58PM	17 Are you aware of any of Anadarko's 7:00PM
18 model doesn't explain very well the production 6:58PM	18 resource assessments that included Shotts's downside 7:00PM
19 you're making, reservoir engineers just kind of 6:58PM	19 recovery factor case of 5 percent in the resource 7:00PM
20 arbitrarily put barriers in the reservoir model to 6:58PM	20 distributions? 7:01PM
21 try to make the production agree with the model. 6:58PM	21 A No, but neither did I see anywhere his 7:01PM
22 Q That's a common technique; right? 6:58PM	22 upside was 35 percent. So they tended to use and land 7:01PM
23 A That's a common technique among reservoir 6:58PM	23 on numbers in between those two.
24 engineers. 6:58PM	24 Q So the answer to my question is no; right?
25 Q Do you know who Doug Shotts is? 6:58PM	25 A Yes. 7:01PM
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<p>1 Q Looking at the -- I'm sorry, strike that. 7:01PM 2 Did you look at the record on the water 3 samples that were acquired from some of the wells? 4 A I looked very briefly at the water samples 5 acquired. 7:01PM 6 Q And did you look at the salinities on 7 Shen 3 and Shen 6 which were between 195,000 and 8 240,000 ppm? 9 A I remember that they were not that unusual. 10 But yes, I remember they are in that range. 7:02PM 11 Q Okay. Based on that range, would you 12 expect the water samples to be from the same basin 13 wide aquifer? 14 A So water samples are -- in terms of their 15 connectivity are usually based more upon pressure 7:02PM 16 because the salinity in the water is going to vary 17 depending on how close you are to the salt face and 18 how connected you are on this as the -- how much of 19 that particular reservoir in that area is actually 20 touching salt. Because the salt dissolves back into 7:02PM 21 the water. 22 So if they were very close and they had 23 different salinities, you might expect that they -- 24 at least at the highest levels, they might be 25 different. 7:03PM</p>	<p>1 Q You are aware that Chris Camden, who we 7:04PM 2 discussed earlier, used the Yucatan 2 gradient 3 instead of the Shen 3 gradient; right? 4 A At what point in time? Which well are you 5 talking about? 7:04PM 6 Q So this is in Pittinger's report at 7 Paragraph 150. 8 A I don't have a copy of Pittinger's report. 9 But... 10 Q You are aware of Chris Camden stating that 7:05PM 11 "I'm using the Yuc 2 aquifer pressures to estimate 12 OWCs. I don't think the Shen 3 aquifer is connected 13 to the west side of the field." 14 You're aware of that; right? 15 A So now we're talking about at Shen 4. Okay. 7:05PM 16 So after Shen 4, because of the difference in pressure 17 of the oil column in Shen 4 sidetrack 1 and bypass 18 versus Shen 2, which is the nearest oil well, then 19 there was a question as to whether or not you should 20 use the water pressures in Yucatan 2, which is 7:05PM 21 actually closer but across the middle of the basin, to 22 estimate the oil-water contacts at Shen 4 or whether 23 or not you should use the Shen 3 pressure, which is 24 all the way across to the east side of the basin. 25 So that was a question and it made a 7:06PM</p>
<p>Page 226</p> <p>1 But the salinities can be different updip 7:03PM 2 and still be the same well downdip. 3 Q Do you agree that fluid density is the 4 controlling factor in the normal hydrostatic 5 gradient? 7:03PM 6 A Yes. 7 Q Now, the Shen 3 water gradients varied; 8 correct? 9 A The water gradient was measured in each of 10 the Shen 3 sands and they were slightly different 7:03PM 11 depending which sand you measured them in. 12 Q So shouldn't those fluids have the same 13 density, the .500 used by Anadarko to project the 14 oil-water contact in Shen 2? 15 A They should have a density which is at least 7:03PM 16 similar. The actual projection depends more on -- it 17 depends a little bit on pressure, but it obviously 18 depends a lot on -- it depends a little bit on 19 salinity. 20 It depends more on pressure, what the 7:04PM 21 pressure in those wells, in those aquifers were. 22 But that's always taken into account, so when 23 someone does the projection, they calculate the 24 density of the water and they use that to project up 25 to the density of the oil. 7:04PM</p>	<p>1 slight difference in which one you used, but both of 7:06PM 2 them are probably valid and the question is, which 3 one do you think has better pressure connectivity to 4 Shen 4? 5 Q And what Chris Camden said was, "I don't 7:06PM 6 think the Shen 3 aquifer is connected to the western 7 side of the field"; right? 8 A Yes, he said he doesn't think that. There 9 is no evidence saying it is or it isn't. 10 Q Let's turn to Paragraph 520 of your 7:06PM 11 report. 12 A "Structure Mapping." 13 Q Yes. This is a quick side note, so the 14 Figure 55 that we see there, is that the coherency 15 map? 7:07PM 16 A That is an extraction of a coherency map 17 along a horizon that has been picked. So somebody has 18 interpreted a horizon that they think corresponds to a 19 marker in the field and then they have extracted the 20 coherency value from the volume at that map. Yes. 7:07PM 21 Q Okay. Let's look at the paragraph above 22 that, 520. 23 So you state in there that by this point 24 of Shen 3, "the teams agreed there was evidence for 25 both east/west and north/south faulting." Correct? 7:08PM</p>

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58 (Pages 226 - 229)

1 A Yes.	7:08PM	1 think that the oil that's in those reservoirs filled 7:12PM
2 Q You can set those aside.		2 those reservoirs up and then did not subsequently
3 What is siderite?		3 move.
4 A What is what?		4 MS. JENSEN: Okay. I've marked as an
5 Q Siderite?	7:08PM	5 exhibit a document that bears the Bates stamp 7:12PM
6 A Siderite?		6 APC-00001505 and this is Exhibit 541. You should be
7 Q Did I say it wrong?		7 able to see it.
8 A It's said right.		8 (Whereupon, Exhibit 541 was marked for
9 Q Okay. You're going to have to fix the		9 identification.)
10 online Google pronunciation because they say	7:08PM	10 BY MS. JENSEN: 7:12PM
11 "siderite."		11 Q This is going to require some fast
12 A Okay. I won't guarantee I'm right, but		12 clicking.
13 that's what I always heard it referred to as.		13 A Okay. September '13, so this must be post
14 Q Take that up with Google. I'm going to		14 Shen 2. What slide are we going to out of 168?
15 say it the wrong way.	7:08PM	15 Q Let's look at slide 75. Apologies, 7:12PM
16 A That's fine.		16 slide 76.
17 Q What is siderite?		17 (Discussion off the record.)
18 A Siderite is a mineral that is present in		18 THE WITNESS: There it goes. It was just
19 sediments and -- in certain sediments, so...		19 a pause in the computer. I'm up to 45 now.
20 Q Okay. What does the presence of siderite	7:09PM	20 You said 70 what? 7:13PM
21 have to do -- or what does it have to do with fluid		21 BY MS. JENSEN:
22 properties?		22 Q Seventy-six.
23 A So usually minerals come out of -- are		23 A "Siderite replacement grains," yes.
24 leached out of rocks when they flow.		24 Q Do you take it from this slide that there
25 And so when you see a lot of siderite in a	7:09PM	25 was presence of siderite in both Shen 2 and Shen 1? 7:13PM
	Page 230	Page 232
1 well and it corresponds also to where there has been	7:09PM	1 A There are some there, but I don't think it 7:14PM
2 a significant distortion or an inconsistency in the		2 was a substantial amount. Whenever you get a piece of
3 sediment, that's part of what you would use to try		3 core, you analyze all of the grains that are in it.
4 to interpret a fault.		4 But they note examples of it in the rock.
5 Q Is it an indication of hydrocarbon	7:10PM	5 Q So there was siderite in both Shen 2 and 7:14PM
6 migration?		6 Shen 1; right?
7 A So hydrocarbons migrate a number of ways.		7 A There was some in there.
8 When hydrocarbons -- they can migrate along a fault.		8 Q All right. You can set that aside.
9 So it can be indicative of that.		9 Paragraph 730 of your report, which is now
10 But hydrocarbons can also migrate	7:10PM	10 Page 344, you talk about slickensides; right? 7:14PM
11 vertically through poor seals, especially if the		11 A Yes.
12 pressure differences are high. There is a number		12 Q Okay. Can you describe the difference
13 of -- and hydrocarbons can migrate laterally through		13 between faults -- strike that.
14 reservoirs.		14 What are slickensides and how do they
15 There is a number of ways hydrocarbons can	7:10PM	15 form? 7:15PM
16 migrate. But it could be -- it's not the only		16 A It's a characteristic in the cuttings that
17 indication of a hydrocarbon migration, but it could		17 imply that there has been movement of the grains
18 imply that.		18 against each other. And so it's usually indicative of
19 Q Let's turn to Paragraph 263 on Page 128 of		19 some level of movement of grains as they slide past
20 your report.	7:11PM	20 each other. So it could be indicative of a fault. 7:15PM
21 A Yes.		21 Q So sometimes slickensides occur along
22 Q Here you say that no siderite -- I think		22 fault planes?
23 I'm saying it now right -- was detected at Shen 2?		23 A Yes.
24 A Right. That was in the core analysis. So		24 Q Do they sometimes occur along fracture
25 they didn't see any of it, so that would make you	7:11PM	25 planes? 7:16PM
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1 A Yes, fractures and faults are, for the most part, used interchangeably. But yes, slickensides can be indicative of a fault or at least a discontinuity where one set of grains have slid against another.	7:16PM	1 A Yes.	7:22PM
5 Q What are deformation bands in a rock?	7:16PM	2 Q All right. And do you see the various wells for Shen depicted here or some of the wells?	
6 A So rocks can be deformed without actually breaking, right, without a fault, they can be bent.		4 A Yes, I see some actual wells and I see some -- I see some recommended locations.	7:22PM
8 And so a deformation band is an area where the sediments have been bent or deformed, but they have not created any offset. So there is no faults.	7:16PM	6 Q Okay. And you see a black line in this map that separates Shen 2 and Shen 3?	
11 Q Does the formation of deformation bands require a significant offset along the plane in the deformation band?		8 A The northwest/southeast black gap, it's a gap in the map, that's why it's black. That gap that separates -- or that runs between Shen 3 and Shen 2,	7:22PM
14 A It doesn't require any offset. If there were offset, then you would have a fault. So what the deformation band is, it's a zone which can extend laterally where the sediments have been deformed.	7:17PM	11 yes, that's a fault.	
18 They have been bent but have not broken.		12 Q Okay.	
19 Q And slickensides impact fluid flow across the fracture or deformation band?	7:17PM	13 A That's interpreted as a fault.	
21 A They can if you have a deformation band, then you've jostled the grains around and you've probably distorted and reduced the porosity space between the grains. And you may have made the path for which fluids need to flow more tortuous.	7:18PM	14 Q Now, are the contours aligned on either side of the feature?	7:23PM
Page 234		15 A No, they -- well, no, they are not and no, they shouldn't be. Otherwise, there is no offset on the fault.	
		19 Q Right. Now, you just answered my next question, which is: If the contours on other side of the line don't align, that means there's sediment that offset; right?	7:23PM
		23 A Right, there's offset here. You can -- the easiest place to look is since the contour interval is 250 feet, every fourth one, I believe, they make a	7:23PM
		Page 235	
1 So deformation bands can serve as a partial barrier to fluid flow.	7:18PM	1 brighter blue line.	7:23PM
3 Q I would like to show you a document. It's loading. It's still loading.		2 So you can look up where it says 51 east and see that that line is -- when you go to the other side of the fault is north of that.	
5 A I'm clicking on it to see when it shows up.	7:19PM	5 So yes, there is an offset on this -- interpreted offset on this fault.	7:23PM
6 Q Okay.		7 Q Can you tell how much the offset is?	
7 A Did you get it loaded?		8 A Well, the -- so the way to do the offset is you check from one side to the other side. So here it looks like about -- now it changes a little bit.	7:24PM
8 Q You should be able to see what has been previously marked as Exhibit 71.		10 So up to the north, it is around one and a half contours. Down to the south, it's only about one contour.	
10 This is PDF of a PowerPoint presentation which bears the Bates stamp APC-00001146.	7:20PM	14 So according to this map, up to the north it's about 400 feet and as I come further south, it -- by the time I get to the green, it's only about 50 to 100 feet and by the time -- then there are -- in the area where the two faults overlap, it changes again.	7:24PM
12 A I can see it, a PowerPoint presentation from December 10th, 2014.		20 But up where the reservoir is, it's probably somewhere between 2 and 400 feet.	7:25PM
14 Q Actually, this one because it's PDF, we can scroll down to slide 54.	7:21PM	22 Q And that fault with that offset separates Shen 2 and Shen 3; right?	
16 A Yes, indeed.		24 A Yes, the way it's interpreted, yes.	
17 Q Okay. So this is a slide showing the Lower Wilcox A; right, a map of the Lower Wilcox A?		25 Q Again, we talked earlier about Chris	7:25PM
19 A Just a minute. I'm on lower Wilcox B, so I went one too many.	7:21PM	Page 235	
21 Q Yes.		Page 237	
22 A Lower Wilcox A, contour interval 250 feet.			
23 Q Okay. And just to double check, so on -- so it's slide 54 even though it doesn't have an actual number on the PowerPoint. Okay.	7:22PM		

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1 Camden and in his email, but Shenandoah 3 was on 2 which side of the field?	7:25PM	1 A Okay. What paragraph or what page? 7:28PM 2 Page 86?
3 A Shenandoah 3 is on the east side of the 4 field. It's the little white X where it says WR 52 5 Number 2 Appraisal. 7:26PM		3 Q Page 86, Paragraph 100 -- sorry, 191. 4 A Yes.
6 Q Right.		5 Q In this paragraph you're commenting on 7:29PM 6 Dr. Merrill's report with respect to the P1 and P99 7 in the MMRA distributions?
7 A That's Shenandoah 3.		8 A Yes.
8 Q And Chris Camden said he didn't think that 9 the Shen 3 aquifer here on the eastern side of the 10 field is connected to the western side of the field, 7:26PM 11 and the western side of the field would be Shen 2; 12 right?		9 Q Have you ever heard of the paper by Rose & 10 Associates from 2001 on the risk analysis of 7:30PM 11 exploration prospects?
13 A Shen 2 is more a central field, but he said 14 that, yes, that he wasn't sure that Shen 3 would 15 necessarily in pressure communication with Shen 2. 7:26PM		12 A Yes.
16 Q And he said it stronger than that; right?		13 Q What does that paper concern?
17 He said, I don't think the Shen 3 aquifer on the 18 east side of the field as we're seeing this now is 19 connected to the western side of the field which is 20 where Shen 2 is? 7:26PM		14 A That paper concerns the statistical 15 distribution of things such as volumes and other key 7:30PM 16 parameters and builds on other suppositions that have 17 been done in the past and still are that says that 18 those must -- that those volumes lie along -- or that 19 those likelihoods fall along a logarithmic curve.
21 A Yes, I mean, he can say he thinks it, but he 22 doesn't show any evidence one way or the other.		20 So if you were to plot in a logarithmic 7:30PM 21 space P1, P10, P50, P90, P99, they would form a 22 straight line.
23 Q You referred to Allan diagrams in your 24 report; right?		23 Q Okay. You should be able to see what's 24 been marked as Exhibit 542.
25 A Yes. 7:27PM	Page 238	25 (Whereupon, Exhibit 542 was marked for 7:31PM Page 240
1 Q What is that? 7:27PM		1 identification.) 7:31PM
2 A It's a diagram you would make of the fault 3 plane showing the juxtaposition of what's on one side 4 of the fault to what's on the other side of the fault. 5 Because in this area, for instance, in 7:27PM		2 THE WITNESS: Okay.
6 Shen 2, in an interval of, say, 2,000 feet, 7 1,000 feet of it is hydrocarbon filled sand. 8 If you were to go on the other side of 9 that fault and move that down, say, 3,400 feet, 10 that means a bunch of those sands are still 7:27PM		3 BY MS. JENSEN: 4 Q Is this the article or document you were 5 just talking about? 7:31PM
11 juxtaposed against each other across the fault. 12 So an Allan diagram you usually use to try 13 to estimate what sands might be juxtaposed across 14 the fault.		6 A Not sure if this is the article or not. 7 This is a part of -- I was wondering if it was part of 8 their manual where they talk about the -- I don't know 9 if this is actually the document or if it's a chapter 10 out of a manual. 7:32PM
15 Q You're aware that Anadarko personnel 7:28PM		11 I haven't actually seen this very specific 12 document before, but that's what it looks like.
16 talked about an Allan diagram project in the context 17 of Shen?		13 Q If you look at Page 26 of the article or 14 otherwise, you can refer to Page 9 of the PDF.
18 A They may have talked about it. I never saw 19 an actual Allan diagram along any of these faults ever 20 displayed. So they may -- if they did one, I never 7:28PM		15 A Twenty-five -- 26, Table 6? 7:33PM
21 saw it.		16 Q Yes.
22 Q So let's turn to Page 86 of your report. 23 You can set this aside.		17 A Okay.
24 A I was going to slide it to 86.		18 Q So are you aware that following the 19 drilling of Shen 2, Anadarko's P10/P90 estimate was 20 between 2.8 and 60? 7:33PM
25 Q All done with that one. 7:28PM	Page 239	21 A I know it was big, but it was -- and which 22 number was it you said was between 2.8 and 6.0? 23 Q 2.8 and 6.0. 24 A You're talking about the volumes in place? 25 Q Yes, for the P10/P90 estimate. 7:33PM Page 241

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<p>1 A Right. For volumes in place, right. Yes, 7:33PM 2 that sounds about right.</p> <p>3 Q So looking at this table, Table 6, and how 4 you described the certainty of the Shenandoah 5 project, what is the range of the expected P10/P90 7:34PM 6 ratio?</p> <p>7 A At -- at the drilling of Shen 2 or --</p> <p>8 Q Let's go along -- yes, at that time and 9 then with each well after that.</p> <p>10 A Well, I don't know exactly following the 7:34PM 11 well, but I know that Shen 2 was, for all practical 12 purposes, its own exploration well because it was not 13 connected and it saw a completely different section 14 than Shen 1.</p> <p>15 So in a lot of ways, I would say based 7:34PM 16 upon Shen 2, you know, that you would be in -- 17 somewhere between wildcat and known productive trend 18 and potentially even rank wildcat in a proven trend 19 given that they were -- where they were located, how 20 they were exploring, so somewhere in that range. 7:35PM</p> <p>21 So somewhere between 10 and 220, if you go 22 by their chart. And I'm not sure I agree with their 23 chart in all cases. But if you use their chart, 24 that's where I would expect you to be.</p> <p>25 Q So was there a development well drilled in 7:35PM Page 242</p>	<p>1 (Recess taken.) 7:37PM 2 THE VIDEOGRAPHER: Back on the record. 3 It's 8:01 p.m. 4 BY MS. JENSEN: 5 Q Dr. Detomo, if you could please turn to 8:01PM 6 Paragraph 918 of your report. 7 A Okay. 8 Q It starts on Page 421 and ends on 422. 9 A Okay. 10 Q Are you with me? 8:02PM 11 A Yes. 12 Q All right. So in this paragraph you are 13 criticizing Mr. Pittenger about economic 14 calculations and as it starts on Page 422, you say 15 that "information regarding fault 8:02PM 16 compartmentalization was accounted for in explicit 17 fault mapping and lower recovery rates (13.8 instead 18 of 30 percent)." 19 What did you mean by "13.8 instead of 20 30 percent"? 8:02PM 21 A Early on in the project, and according to 22 the work done by the reservoir engineers, without any 23 faulting at all, the estimation was because of the 24 fluids and the porosity quality of the rock, that 25 recovery efficiencies could approach over 30 percent. 8:02PM Page 244</p>
<p>1 the Shenandoah basin prior to 2014? 7:35PM 2 A In the Shenandoah basin? Prior to 2014, I 3 don't recall the date that the Yucatan 1 or Coronado 4 were drilled. So I don't remember if one of them were 5 before that. 7:35PM 6 The only other well that was obviously 7 2008, 2009 was the Shen 1 well, but one I think 8 evidence certainly at this point and after this was 9 that those two wells were not connected, so they 10 weren't ineffectively the same basin. 7:36PM 11 Q Was there a step-out or extension well 12 drilled in the Shen basin prior to 2014? 13 A Other than Shen 1, Coronado or Yucatan? 14 Like I said, I don't recall the exact date. I would 15 have to look it up for when Yucatan 1 and Coronado 1 7:36PM 16 took place. 17 But even if those were before that, then 18 that would only put you in the wildcat in known 19 productive trend, right. 20 So that would still put you in the 10 to 7:36PM 21 120 range for volumes. 22 MS. JENSEN: I would like to take a quick 23 break. 24 THE VIDEOGRAPHER: We're off the record. 25 It's 7:37. 7:37PM Page 243</p>	<p>1 So some of the very early volume estimates used 8:03PM 2 recovery factors of around 30 percent. 3 Once they became aware that there might be 4 unmappable small-level faulting and other production 5 issues, they lowered the recovery factor. And I 8:03PM 6 believe one -- the last recovery factor I remember 7 them using was 13.8 percent for the recovery factor. 8 So that played into one of the components 9 of the volume reduction. 10 Q Okay. Now turning to your report at 8:03PM 11 Paragraph 112, Page 43. 12 A Yes. 13 Q You state, "There is no universally 14 accepted definition of net pay and there is no 15 prescriptive method for evaluating it." 8:04PM 16 Now, how would you define net pay? 17 A A net pay is defined as the portion of an 18 interval which has -- from which recoverable 19 hydrocarbons can be extracted. 20 And so in general, in an interval, some of 8:04PM 21 it may be high-quality sand and some of it may be 22 lower, some of it may be shales. 23 So the net pay would then be an estimation 24 of which part of it you can extract hydrocarbons 25 from. 8:05PM Page 245</p>

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1 Q And if there is no prescriptive methods 8:05PM	1 society would be an authoritative source on the 8:07PM
2 for evaluating net pay, how did Anadarko calculate 2 definition on net pay; correct?	
3 net pay? 3 A Yes.	
4 A Every petrophysicist who estimates net pay 4 MS. JENSEN: Okay. No further questions	
5 defines a cutoff as to what -- based upon their logs 8:05PM 5 at this time. 8:08PM	
6 as to what level they think represents recoverable oil 6 Let's go off the record.	
7 and based upon those logs below which they think would 7 THE VIDEOGRAPHER: We're off the record.	
8 you not be able to recover the oil. 8 It's 8:08 p.m.	
9 So if you have any two petrophysicists 9 (Recess taken.)	
10 evaluate the same well, you'll get slightly 8:05PM 10 THE VIDEOGRAPHER: Back on the record. 8:08PM	
11 different answers. 11 It's 8:08 p.m.	
12 Q So you can't describe how Anadarko 12	
13 calculated net pay? 13 EXAMINATION	
14 A Sure, usually I can do it in technical 14 BY MS. PHILLIPS:	
15 terms. You take the gamma ray log, you go ahead and 8:06PM 15 Q Thanks, Dr. Detomo. I just have a few 8:08PM	
16 define on the gamma ray log what the shale -- 16 questions for you.	
17 100 percent shale line is, what the 100 percent sand 17 You were asked questions about when the	
18 line is, use that to estimate net sand, then you go to 18 company wrote down costs associated with Shenandoah.	
19 the resistivity log. 19 Do you recall?	
20 You use the resistivity log in order to 8:06PM 20 A Yes. 8:09PM	
21 find what the saturation of where the oils are and 21 Q When did the company write down costs	
22 you create a cutoff on that that looks to be 22 associated with Shenandoah?	
23 recoverable. 23 A May of 2017.	
24 And then you overlay the two and extract 24 Q And are you expressing an opinion as to	
25 out the number of feet that you have within that 8:06PM 25 when the company made the internal decision to write 8:09PM	
Page 246	Page 248
1 interval which corresponds to what you've defined as 8:06PM	1 down costs associated with Shenandoah? 8:09PM
2 recoverable oil net pay. 2 A No.	
3 Q So is that how you would calculate it or 3 MS. PHILLIPS: That's all for defendants.	
4 is that how Anadarko calculated it? 4 MS. JENSEN: We can go off the record.	
5 A That's how every petrophysicist calculates 8:06PM 5 THE VIDEOGRAPHER: Off the record. It's 8:09PM	
6 it. The only question is where do you decide to put 6 8:09 p.m.	
7 those cutoff lines. And those are an interpretation 7 (Proceedings concluded at 8:09 p.m. EST)	
8 or an estimation by the individual petrophysicist. 8	
9 Q And you're aware that the Society of 9	
10 Petroleum Engineers has a definition for net pay; 8:07PM 10	
11 right? 11	
12 A Yes. 12	
13 Q What's the definition under the Society 13	
14 for Petroleum Engineers? 14	
15 A I don't recall it off the top of my head. 8:07PM 15	
16 But it doesn't change my opinion because it amounts to 16	
17 what I just described, including the process about how 17	
18 you measure it. 18	
19 Q Even though you don't know what it is off 19	
20 the top of your head, you say it's the same as what 8:07PM 20	
21 you just said? 21	
22 A You asked me to tell you what the society 22	
23 says it is. I can't quote the society without looking 23	
24 it up. 24	
25 Q In any event, the definition for the 8:07PM 25	
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1 I, LYNNE M. LEDANOIS, a Certified
 2 Shorthand Reporter of the State of California, do
 3 hereby certify:
 4 That the foregoing proceedings were taken
 5 before me at the time and place herein set forth;
 6 that any witnesses in the foregoing proceedings,
 7 prior to testifying, were duly sworn; that a record
 8 of the proceedings was made by me using machine
 9 shorthand which was thereafter transcribed under my
 10 direction; that the foregoing transcript is a true
 11 record of the testimony given.

12 Further, that if the foregoing pertains to
 13 the original transcript of a deposition in a Federal
 14 Case, before completion of the proceedings, review
 15 of the transcript [] was [x] was not requested.

16 I further certify I am neither financially
 17 interested in the action nor a relative or employee
 18 of any attorney or party to this action.

19 IN WITNESS WHEREOF, I have this date
 20 subscribed my name.

21 Dated: March 11, 2023

22

23

24 *lynne Marie Ledanois*
 25 LYNNE MARIE LEDANOIS
 CSR No. 6811

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1 NAME OF CASE: In re Anadarka Securities Litigation
 2 DATE OF DEPOSITION: 3/9/23
 3 NAME OF WITNESS: Rocco Detomo, Jr., Ph.D.
 4 Reason codes:

5 1. To clarify the record.
 6 2. To conform to the facts.
 7 3. To correct transcription errors.

8 7 Page ____ Line ____ Reason ____
 From _____ to _____

9 8 Page ____ Line ____ Reason ____
 From _____ to _____

10 11 Page ____ Line ____ Reason ____
 From _____ to _____

12 13 Page ____ Line ____ Reason ____
 From _____ to _____

14 15 Page ____ Line ____ Reason ____
 From _____ to _____

16 17 Page ____ Line ____ Reason ____
 From _____ to _____

18 19 Page ____ Line ____ Reason ____
 From _____ to _____

20 21
 22
 23
 24
 25

Signature of Deponent

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Page 253

1 Ms. Rachel Jensen, Esq.

2 rjensen@rgrlaw.com

3 March 11, 2023

4 In re ANADARKO PETROLEUM CORPORATION SECURITIES LITIGATION

5 March 9, 2023, Rocco Detomo, Jr. (JOB NO. 5781021)

6 The above-referenced transcript has been

7 completed by Veritext Legal Solutions and

8 review of the transcript is being handled as follows:

9 ___ Per CA State Code (CCP 2025.520 (a)-(e)) – Contact Veritext

10 to schedule a time to review the original transcript at

11 a Veritext office.

12 ___ Per CA State Code (CCP 2025.520 (a)-(e)) – Locked .PDF

13 Transcript - The witness should review the transcript and

14 make any necessary corrections on the errata pages included

15 below, notating the page and line number of the corrections.

16 The witness should then sign and date the errata and penalty

17 of perjury pages and return the completed pages to all

18 appearing counsel within the period of time determined at

19 the deposition or provided by the Code of Civil Procedure.

20 ___ Waiving the CA Code of Civil Procedure per Stipulation of

21 Counsel - Original transcript to be released for signature

22 as determined at the deposition.

23 ___ Signature Waived – Reading & Signature was waived at the

24 time of the deposition.

25

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1 ___ Federal R&S Requested (FRCP 30(e)(1)(B)) – Locked .PDF

2 Transcript - The witness should review the transcript and

3 make any necessary corrections on the errata pages included

4 below, notating the page and line number of the corrections.

5 The witness should then sign and date the errata and penalty

6 of perjury pages and return the completed pages to all

7 appearing counsel within the period of time determined at

8 the deposition or provided by the Federal Rules.

9 ___ Federal R&S Not Requested - Reading & Signature was not

10 requested before the completion of the deposition.

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1 In re ANADARKO PETROLEUM CORPORATION SECURITIES LITIGATION

2 Rocco Detomo, Jr. (JOB NO. 5781021)

3 E R R A T A S H E E T

4 PAGE ____ LINE ____ CHANGE _____

5 _____

6 REASON _____

7 PAGE ____ LINE ____ CHANGE _____

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9 REASON _____

10 PAGE ____ LINE ____ CHANGE _____

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13 PAGE ____ LINE ____ CHANGE _____

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16 PAGE ____ LINE ____ CHANGE _____

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18 REASON _____

19 PAGE ____ LINE ____ CHANGE _____

20 _____

21 REASON _____

22

23 _____

24 WITNESS Date

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